FINAL REPORT

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7.0 OBJECTIVES

The El Paso Water Utilities (EPWU) has, as a primary function, the responsibility to provide for the water demands of the local El Paso community. However, as a major land owner, the Public Service Board (PSB) has also found itself intricately tied to the land development process. The PSB is not a land developer, but it owns a significant amount of property that will ultimately be developed in some fashion.

As a public entity, the PSB is also intricately tied to greater issues within the community – in specific quality of life issues. As such, the EPWU has established a process by which any property over fifty (50) acres that the Utility anticipates on selling must first be formally studied as a "Land Study". One of the goals of a land study is to "review and approve a general plan for the development of property including the layout of arterial streets, open areas, sites for public facilities and utilities … including street improvements, drainage, sewerage, fire protection, schools, parks, and other such facilities…" *(El Paso Subdivision Ordinance Section 19.08.040 (B))* In short, the land study helps plan for the basic framework of a community.

Regarding the Northeast Land Study, the PSB has noted specific objectives that are critical. These objectives are summarized below.

NATURAL ENVIRONMENT

One goal of master planning or of land studies in general is to provide standards to promote responsible development and efficient use of the natural environment. Responsible land development blends economic necessities with context sensitive design. It is important to view the natural environment as a critical component of the development criteria. Traditional land planning accounts for soil conditions, environmentally sensitive areas, view corridors, historical connections, and other natural features. The EPWU directed the land study efforts to be sensitive to these issues and develop a plan that enhances the natural environment instead of disregarding it.

UTILITY INFRASTRUCTURE

Although there is some infrastructure on and adjacent to the subject property (See Plates 15, 16 and 17 of Chapter 5.0 – Infrastructure, of the Existing Conditions Report), additional infrastructure construction will be required in order to serve future development. This additional utility infrastructure need will generally be met through the extension of lines within each development and extension of lines to development. These improvements will generally be the responsibility of the future developments. The EPWU has studied and estimated the total cost of water, wastewater and reclaimed water infrastructure needed in order to facilitate future development (See Section 10). Effective land planning is sensitive to utility costs and integrates appropriate densities, land uses, and distribution to maximize the efficiency of the needed infrastructure. The EPWU has blended the land planning efforts with engineering studies to accomplish this.

The EPWU wishes to minimize infrastructure costs while allowing development to occur in a responsible manner. In addition to the preparing the land plan and thoroughfare plan, the consultant team has studied the stormwater collection system.

WATER SERVICE – OBJECTIVES TO BE PROVIDED BY EPWU

SANITARY SEWER SERVICE – OBJECTIVES TO BE PROVIDED BY EPWU

RECLAIMED WATER SERVICE – OBJECTIVES TO BE PROVIDED BY EPWU

STORM WATER SYSTEM

As part of developing the various land planning alternatives, a detailed understanding of the stormwater system dynamics is necessary. Typically, drainage and detention requirements are of primary concern to development, since they can be a significant limiting factor. However, when studying stormwater issues, the analysis area is usually much greater than any one particular site. Stormwater runoff has upstream and downstream dynamics that must be studied as well. Therefore, it was necessary to study the overall project site which consists of 14,563 acres and contributing watersheds and potential discharge areas. For background information, please refer to Chapter 1.0 - Natural Environment, of the Existing Drainage Facilities of the Existing Conditions Report. EPWU directed that this study balance infrastructure investments with overall development realities and financial returns for the EPWU.

MASTER THOROUGHFARE PLAN

According to the City of El Paso Planning staff, the currently adopted City of El Paso Master Thoroughfare Plan (MTP) (Plate 12 in Chapter 3.0 of the Existing Conditions Report) was modeled and found sufficient for the uses shown on the currently adopted City of El Paso Projected Land Use Plan. However, as noted in the existing conditions report there are inconsistencies which should be reconciled. As per arrangements made by the EPWU the MTP will be studied by City Staff and not by the consultant. The EPWU directed the consultant to utilize the existing thoroughfare system as indicated in the currently adopted MTP. However, the EPWU also directed the consultant to provide distinct land planning alternatives that were not simply variations of one style of land planning.

The currently adopted Projected Land Use Plan (Plate 14 in Chapter 4.0 of the Existing Conditions Report) shows large areas (approximately 4550 acres) designated as Aquifer Storage and Recharge (ASR). This designation substantially decreases the land available for development. The necessary buffer area for a water well includes a 150 foot radius around the water well and not large swaths of land as indicated on the City's Projected Land Use Plan (PLUP). Due to this policy difference, the densities of the project site will increase compared to the currently adopted PLUP regardless of which plan is selected,

thereby increasing the vehicle trips currently modeled in the MTP. City Planning staff are currently studying the MTP. This process involves calculating land use assumptions which include land use type, density, and thoroughfare linkages. This data is manipulated and studied using transportation modeling software (TransCAD in this case). This study may require three (3) months to complete. The baseline data that will be utilized for this study will come from the Metropolitan Planning Organization's regional model. The model utilizes a series of land use and trip generation (by land use) assumptions which will be reviewed by City Staff for appropriateness and completeness.

Once this study is conducted, the City Staff will consider proposing a formal update to the MTP. Since the MTP is a component of the Comprehensive Plan, this update must follow state regulations (Chapter 213 of the Texas Local Government Code) that govern public notification, public hearings, and a formal process. Updating the City of El Paso's Comprehensive Plan could require an additional three (3) months after the study is complete.

The Texas Department of Transportation (TxDOT), the Metropolitan Planning Organization (MPO), and the City of El Paso Traffic engineers have all generally supported the potential realignment of roadways to create a better land plan; however, all entities have stated the need for an updated thoroughfare analysis.

Optimally, the Master Thoroughfare Plan would be modified prior to or in conjunction with a Land Use Study; however, the EPWU and the City of El Paso have committed to undergoing these two processes separately. The City Plan Commission has the authority to find a changed condition present and adopt an updated land plan if sound planning and engineering principles have been adhered to.

LAND USE AND GROWTH PATTERNS

"Growth occurs first with jobs, then rooftops, and finally retail" according to one stakeholder. In some markets like El Paso, there seems to be a shortfall of housing regardless of the overall economic indicators. Housing starts have continued to climb while the economy has slowed locally and nationally. Therefore, it appears that El Paso is in a strong residential development environment. As the recession has waned, the economic indicators for El Paso have steadily increased, including job growth which bodes well for the continued pressure for residential development *(El Paso Times)*.

The EPWU's Northeast Property is strategically located between Ft. Bliss and the White Sands Missile Range. The opportunity for non-residential and residential growth related to military or military support is tremendous. This could be a prime location for companies specializing in military intelligence, military machinery, space exploration, science and technology, etc. Moreover, an additional 3,800 soldiers have been announced to arrive at Ft. Bliss within the next 12-18 months *(El Paso Times February 2004)*. This boost in the population will impact housing demands, commercial retail demands and traffic related issues. In many regards, Ft. Bliss can be considered as a "job generator" in

terms of the typical growth patterns. As Ft. Bliss grows, the need for housing will increase and lastly commercial-retail demands will also increase. Demand for single family developments will continue to increase due to the growth of the military presence and the shrinking availability of land in other areas of El Paso.

It is important to state that the foothills portion of this project has the potential to be developed as high-end residential, and/or a resort-like community. However, the success or failure of higher end developments will be linked to the quality of developments that occur initially. For the EPWU to truly maximize its land value and for the City of El Paso to have a diverse, quality community, a minimum set of development standards will be needed. These standards will protect the Utility's investment in future land sales. The EPWU directed the land study efforts to recognize these market influences. The EPWU wishes to balance available infrastructure with future investments in order to allow development to occur in a responsible, comprehensive manner.

HOUSING

As a general rule, communities are made up of various housing types, sizes and price points. The overall mix of residential types and sizes is critical to sustainable development of the subject property; therefore, the EPWU took great care to have a land plan which reflects a diverse community. A variety of housing types and price points are necessary in order to provide shelter to different age groups, income groups, and offer lifestyle choices. The EPWU directed this study to allocate densities and hence housing sizes and prices in such a way as to address probable needs for an evolving community.

In addition to this, the EPWU and the City of El Paso directed this study to address the potential for a retirement community. Communities like Phoenix and Tucson Arizona have recently attracted a growing number of retirees in master planned communities that incorporate recreation, leisure, retail, office, residential and social activities. Due to El Paso's similar climate, it is possible that a master planned retirement community in El Paso could cater to the growing demand of retiring military personnel in the local area. Currently there is no master planned retirement community in El Paso. There are a select number of assisted living facilities in El Paso; however, the community has identified the potential need for a master planned community that targets retirees.

COMMUNITY FACILITIES

As noted previously, a comprehensive land study must account for a number of issues, including community facilities and services. Although some of these services are a purely "City of El Paso" function, the EPWU directed that these quality of life topics also be addressed if possible.

The EPWU cannot implement the City's policies in terms of how or where to install certain community facilities, but the EPWU did, as a primary objective, want

coordination between this process and the various entities – City departments, school districts, and other civic organizations.

- FIRE PROTECTION
  The City of El Paso Fire Department has recently been awarded a Category 1 ISO rating; this is the top rating that can be achieved. Currently there are fewer than fifty (50) cities across the country with such a rating. The ISO rating is a reflection of a number of factors which include personnel (volunteer and paid), water availability (total amount and proper distribution), and technical merits (training, dispatch system, and response time). Given this issue, it is critical for this land study to take into account future development and hence future fire protection needs. The EPWU directed this study to accommodate the fire department's needs for future facilities. Although ultimate, detailed locations for fire sub-stations are not set, the land study was to provide a number of possible locations for this use.

- POLICE PROTECTION
  The City of El Paso has been recognized as one of the safest cities in America. This honor and distinction are a function of decreased crime rates, trained personnel, and community awareness programs. As with the fire protection system, the EPWU directed that this study accommodate future police/safety needs. Although ultimate, detailed locations for police sub-stations are flexible, the land study was to provide a number of possible locations for this use as directed by the EPWU.

- HEALTH SERVICES
  The health care system of a community is comprised of a mix of medical offices, clinics and primary, secondary and tertiary delivery mechanisms. Some of these are purely publicly funded entities but most are purely entrepreneurial entities. The EPWU directed that this land plan provide for a land use mix that could incorporate future health care demands. As such the land plan was to designate areas for health services. As with fire protection and police protection, the land plan provides for general locations for office locations, large footprint institutional uses and public areas. These areas have the flexibility to be used for health and safety uses.

- EDUCATION
  The subject property is part of two (2) school districts (El Paso ISD and Ysleta ISD - see Plate 9 in Chapter 2.0 of the Existing

Conditions Report). Generally, McCombs Blvd. outlines the separation of the school districts. The EPWU directed this study to coordinate with both school districts for their ultimate needs. After developing general population models, the total number of schools needed (elementary, middle and high schools) was determined using the various criteria from EPISD and YISD, respectively. The EPWU directed that both school districts be contacted and have ample opportunity to participate. This was a critical component.

- PARKS AND RECREATION
  When the general public is asked about "quality of life", parks and recreation services are usually at the top of the list. Parks and open space are critically linked to quality developments and can take on various forms including active recreation parks, linear parks, hike-bike trails, passive open space, etc. The EPWU directed this study to closely coordinate with the City of El Paso's Parks and Recreation Services staff. Additionally, the EPWU directed that as a part of this study, the State Parks System and local civic groups be contacted as well. The EPWU directed a significant focus on this issue to try and meld a land plan that was accommodating to various groups.

ECONOMIC DEVELOPMENT

An incidental function of land planning is the overall economic impacts of development. Housing development, for example, creates general "revenues" from construction jobs, property taxes, user fees, etc. However, housing development also creates general "costs" relative to water demand, sewer demand, social services, school demands, etc. Similarly, every type of land use can be evaluated from this perspective. Non-residential development (commercial, retail, industrial, etc.) creates a variety of revenues (jobs, property taxes, inventory taxes, sales tax, etc.) and various costs (water demand, police and fire safety, etc.) but does not create costs to the school districts. One simple conclusion would be to allow more non-residential development and less residential development. However, the two basic types of development are at opposite sides of the same spectrum. Without residential development, commercial development is not readily justified in the free market. Commercial retail development follows the residential trends. The EPWU directed that this land study take into account general principles of a balanced development system which limits the overall burden to the public while increasing positive economic development.

The economic development objective is important for a number of reasons. First, this objective addresses the overall evolution of a city by insuring that there is constant and continuous mix of land uses. Second, non-residential development is typically considered a scarce commodity. There is a finite limit on the amount of gross leaseable area that can

be absorbed in an economy. This limit is a direct result of population, the amount of disposable income, and total income in an area. Third, as the PSB dispenses of land, one must note that land for non-residential development sells for exponentially higher rates than land for residential development. Therefore, a careful balance of both residential land and non-residential land ultimately increases the yearly cash flow for the EPWU, but also the overall value of the property. The EPWU decided not to conduct an economic impact analysis or market analysis for the land due to budget constraints and time constraints, but the EPWU did direct that the study adhere to best practices in terms of value maximization as a result of land use mixes.

COMMUNITY APPEARANCE

- ARROYOS

  One of the most notable features of the PSB land is the natural topography, views of the mountains and general scenic characteristics. Additionally, however, the use of arroyos is critically relative to efficient stormwater management. The challenge was to utilize the arroyos as effectively as possible, while meeting city development criteria and mitigating some of the negative impacts usually associated with standard channelization techniques. Additionally, the EPWU inquired as to how other arid communities in the southwest utilize arroyos. At present the City of El Paso's stormwater drainage ordinance is fairly limited in terms of its flexibility. This study considered alternative means to local standard stormwater management practices. Specifically, the consultant team developed ideas to integrate arroyos and open channels into the subdivision layout process. Several different planning options are presented in "Arroyos Section" of Chapter 8.

  Recently, the City of El Paso has been engaged in a review process in terms of how to address the development of arroyos. The Planning Research & Development Department has created the AO-HOC committee to study and provide recommendations about the arroyos. Local civic organizations believe that arroyos should be protected and left in their natural state. The City is currently considering how this approach might be implemented without violating any land use rights. The City Engineering Staff has been studying best practices and has asked for input from a number of entities. No specific recommendation has been forwarded.

  The EPWU directed the Consultant to consider plans that were sensitive to the natural features both from an engineering perspective as well as from a quality of life perspective.

- GATEWAYS AND STREET DESIGN

At the onset of the master planning efforts, the EPWU indicated the desire to create an area that elevated the overall appeal of the northeast. The Consultant was to focus on creating a master planned community atmosphere that had an identity and a positive image. As such, the Consultant identified gateways and street designs as one of the most critical elements of good neighborhood design. For communities to have cohesive identity, special attention was necessary in terms of gateways, vistas, view corridors and streetscapes. The EPWU directed the Consultant to develop concepts that were more in keeping with master planned communities that were comprehensive in design and approach. This process was to help improve quality of life characteristics in the area.

PUBLIC INPUT

Throughout this process, the entities listed in Table 7.1 were invited to participate. The stakeholder involvement included the following:

- Stakeholder Input Meetings
  - General Meeting at NE Command Center
  - General Meeting at Nolan Richardson Middle School
  - General Meeting at EPWU
  - General Meeting at Home Builder's Association
- Focus Group Presentations
  - Group presentation to EPNG
  - Group presentation to Home Builder's Association
  - Group presentation to City Staff and EPWU staff
  - Group presentation to EPISD and YISD
- Individual Charette Discussions
  - Individual citizens
  - City Staff (planning, engineering, parks) and EPWU staff
  - EPISD and YISD
  - Texas Parks and Wildlife
  - Various Developers and Home Builders Association

Table 7.1: STAKEHOLDER LIST

• ACRO Development-Desert View	• El Paso Electric Company
• Borderland Mountain Bike Association	• El Paso Mountain Committee
• Celebration of the Mountains	• El Paso Natural Gas
• Chihuahuan Desert Wildlife Rescue	• Ft. Bliss
• City of El Paso – Building Services	• Franklin Mountains State Park
• City of El Paso - Economic Development	• Franklin Mountains Wilderness Coalition
• City of El Paso – Engineering	• Greater El Paso Association of Realtors
• City of El Paso - Executive Assistant	• Home Builders Association
• City of El Paso - Fire Department	• Hunt Building Corporation
• City of El Paso – Libraries	• Industrial Realty Group
• City of El Paso – MPO	• Northeast Civic Association
• City of El Paso – Municipal Services	• Northeast Community Development Org.
• City of El Paso - Parks & Recreation	• Northeast Healthy Community Council
• City of El Paso – Planning	• Northeast Concerned Citizens Group
• City of El Paso - Police Department	• Painted Dunes Golf Course
• City of El Paso Rep. John Cook	• JNC Land Inc.
• City of El Paso-Storm Water & Pollution Control	• Sierra Club
• City of El Paso - Traffic Engineering	• Southern Union Gas
• Colony Development	• Southwest Land Development Services
• Congressman Silvestre Reyes	• Texas Commission on Environmental Quality
• El Paso Archeological Society	• Texas Parks & Wildlife Commission
• El Paso Association of Builders	• Tropicana Homes
• El Paso Bicycle Association	• TXDOT
• El Paso Black Chamber of Commerce	• U.S. Corps of Engineers
• El Paso Chamber of Commerce	• EP ISD and Ysleta ISD
• El Paso Community College	• El Paso Community Foundation
• El Paso Hispanic Chamber of Commerce	

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8.0 PROPOSED PLAN ELEMENTS

RETIREMENT COMMUNITY

City of El Paso Representative John Cook has facilitated a Steering Committee focused on a retirement community in Northeast El Paso for the past 18 months. This group's original plan was to develop a retirement community which could be focused on capturing the military retirees from Ft. Bliss. With El Paso's low cost of living and arid climate the group believed this would be an ideal setting for a retirement community for military personnel who were already familiar with the area and had a sense of nostalgia for El Paso.

The steering committee focused on creating a retirement community similar to those in Arizona or Florida that encompass a golf course. Initially, the group wanted to develop this community with local development resources around the Painted Dunes Facility. The Steering Committee wanted the EPWU to release 50-80 acres for this project.

After numerous meetings and discussions regarding different retirement communities around the country, the Steering Committee's direction changed. They discovered that a true retirement community required approximately 600-800 acres and had a number of other amenities other than just golf. This was a much larger project than initially anticipated. Also, these communities tend to have easier levels of golf course play. Painted Dunes has the reputation of being a more difficult golf course than a typical retirement community has. The committee also agreed that this project would require a large land developer to install the front end costs of the project and the large cost of the amenities. The committee believed that, in all likelihood, a national developer that specializes in these types of developments would need to be identified and recruited.

Plates 21 and 22 in Chapter 9.0 illustrates the conceptual golf course layouts for a retirement community area. These are for illustrative purposes only.

RESORT COMMUNITY

During the initial discussions in this master planning project, the possibility of a future resort development was also discussed. This development would most likely occur in the foothills of the Franklin Mountains in the northwest part of the subject property. This location offers a higher elevation for the views of the City. The natural topographic relief on this site would be ideal for a resort golf course. This resort development depends on the quality of the prior developments leading up to the area. If the subject property develops without any architectural/aesthetic codes or guidelines in a haphazard manner, a resort community will be unlikely to materialize. A resort community development requires a master plan vision with mechanisms in force to apply this vision. It will most likely be one of the last developments to occur.

ARROYOS

Standard engineering regulatory practices in the local area result in efficient channelization of arroyos. Basically, these waterways are graded to meet stormwater runoff requirements and then are finished with concrete banks and bottoms. The consultant team proposed an alternative approach. Original considerations were to use the natural environment to better identify the area. One way was to preserve the arroyos in Northeast El Paso, while minimizing developer's costs. The arroyos could be used as linear detention facilities as well as drainage ways. Detention facilities are currently required by the City of El Paso to slow the velocity of the runoff water. The arroyos could contain a system of weirs to retain the stormwater runoff in heavy rainfall events as illustrated below:

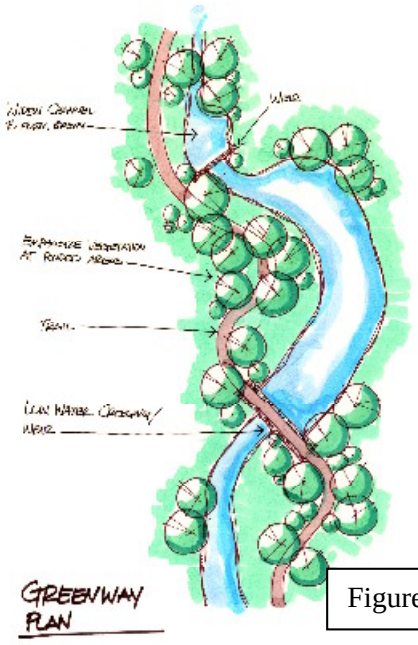

Figure 8.1

*Please see Plate 25-A for flood zone areas.

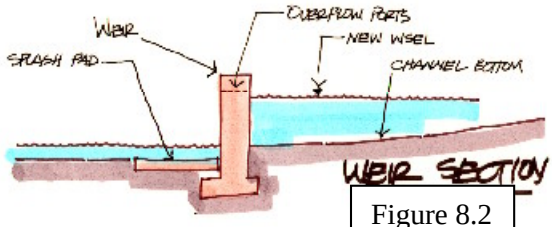

Figure 8.2

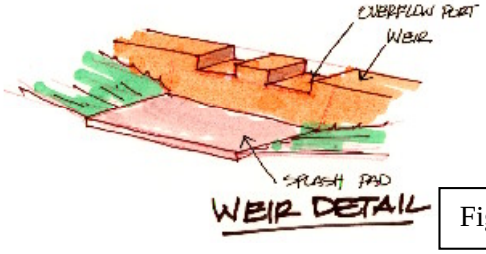

Figure 8.3

If the water was detained for a period of time, it would allow the vegetation in the immediate vicinity to benefit from the rain event. This could provide a lush environment, while protecting and enhancing the natural beauty and life forms of the arroyos.

As the study progressed, however, the consultant team concluded that the Northeast property available for development does not have well defined arroyos. Except for the immediate foothills area, the vast majority of land on the Northeast is relatively flat. Therefore, although this idea could be used to improve the "look" of the area, it can only be used effectively in a very limited area. However, the areas where this approach might be applied, has been reserved as a "Natural Transition Buffer" and is not anticipated to be developed.

Creating detention facilities in the arroyos, with staged weirs, brings value to a natural amenity already existing in the northeast. Trails could occasionally cross over the arroyos at key weir locations. The facing of these key weir locations could be constructed with native stone adding a more finished look without significant additional costs. An example is illustrated below:

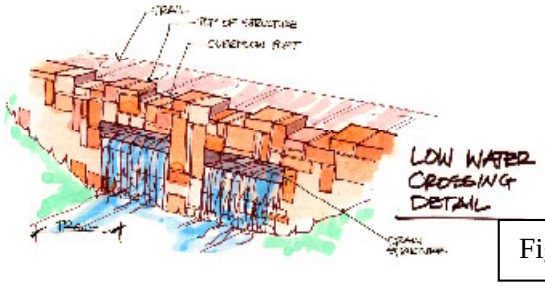

Figure 8.4

Integrating the drainage arroyos, detention facilities, and the hike and bike trails allows a developer to more fully utilize the 100 year flood plain, add an amenity that the citizens of Northeast El Paso can enjoy, and add value to the overall development project.

HIKE AND BIKE TRAIL SYSTEM

Currently in El Paso, citizens identify the Resler hike and bike trail system as a positive example of a pedestrian friendly amenity. However, developers have noted concerns regarding the cost of installing such intense improvements on every project. The challenge for this project was to find a way to keep the quality of a Resler-like trail system but minimize additional costs.

This was accomplished by providing similar amenities of landscaping and park furniture such as benches, but strategically locating them at nodes. Research on "walk-able communities" indicates that pedestrians will comfortably walk ¼ mile distance. Instead of lining the entire length of the hike and bike trail system with intense landscaping and furniture, placing these amenities at strategic intervals could create a positive impact while minimizing the overall costs.

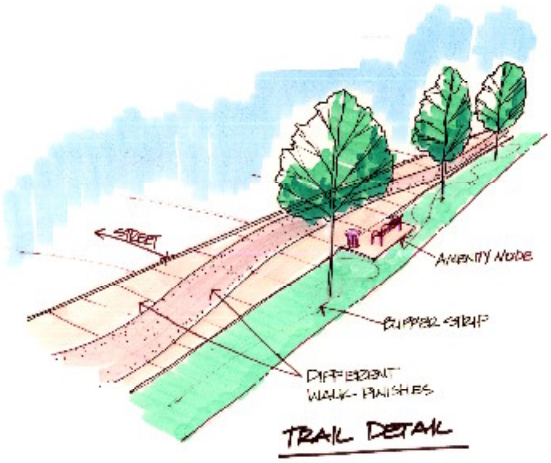

Figure 8.5

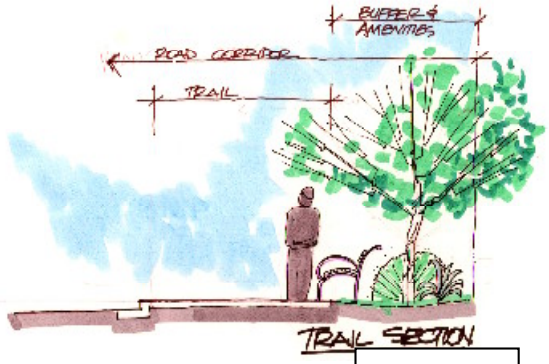

Figure 8.6

The details of the concrete finish on the trail could be altered in such a way to create a more pedestrian friendly look than a typical sidewalk. This type of detail has a minimal monetary impact, yet it still has an attractive appearance.

Focusing on the details of the hike and bike trail placement can also create a better amenity without increasing the cost. If the trail is placed next to the arroyo (within or adjacent to the 100-year flood plain) pedestrians can have a more pleasing experience. Instead of separating the hike and bike trails from the community (using fences, barriers or poor land use planning) the goal is to integrate these uses into the community neighborhood experience. Examples of these are shown below:

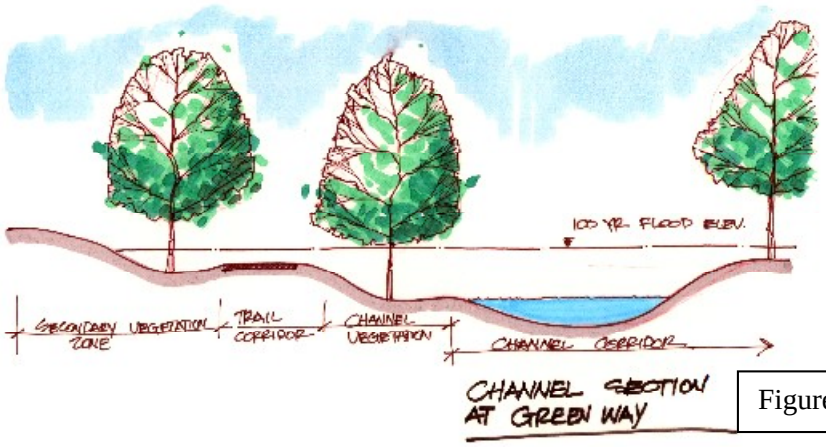

Figure 8.7

Generally, bicycle routes should follow lower streets in the transportation hierarchy, through a system of subdivision "connectivity" rather than having alignments congruent with major thoroughfares.

TOWN CENTER

Best practices in land planning indicate the need for a diverse community in order to reach an economic balance. Typically, a maximum of 70% of a community should be developed as single family homes. Some studies suggest that for long term economic health of a community an even greater amount of non residential land should be reserved. There must be a non-residential tax base for the community to support City services such as fire department, police department, schools, community facilities, and city infrastructure.

Although in El Paso commercial activity has typically occurred in a corridor "strip center" development pattern, a more comprehensive and pedestrian context way of creating opportunities for non-residential developments is the use of "nodal development" – in this case a "Town Center" with an identifiable center and edge. Not only is this urban form a much more "user friendly" context, but the economic benefit from this type of non-residential development exceeds standard "strip development".

A town center allows for development to concentrate around common open spaces, maximizing infrastructure investments, and creating a social space for communal interaction that is not dominated by the vehicle. This type of development places less emphasis on the vehicle trip and more emphasis on sustainable development patterns. See Plate # 45 for the Town center location.

Key components to a successful town center development include the following:

Urban Form – Development patterns in the United States (including the local trends) for the past forty-fifty years have slowly evolved from an

urban form to a more "suburban form". Separating these land uses and decreasing density has led to an increase in vehicle trips, traffic congestion, infrastructure costs and an overall economic shortfall in most communities. For a variety of reasons, most development that has occurred recently is low height, low density, homogenous single use, development. A "town center" or any other type of nodal development, utilizes practices found in early American history, as well as contemporary Europe and Latin America (Mexico, Central America, South America, etc.). Rather than having a series of disconnected single-use developments, "nodal development" promotes a dense mix of land uses which recreate the social benefit of a community. Urban Form promotes social interaction and discourages an over-dependency on vehicle trips. For the NE Master plan approximately 850 acres were dedicated for Town Center use. The NE Master Plan Town Center provides mixed uses, commercial uses and parks surrounded by high density residential pods.

Mix of Uses – Zoning Districts in most zoning ordinances require a separation of land uses. For nodal developments to be successful, a complete integration of land uses is required. Although it is still a successful practice to isolate heavy industrial uses from residential uses, development trends and studies have illustrated the success of integrating residential, office, retail and commercial uses (especially with an intentional decrease in vehicle trip reliance). Co-locating these various uses requires different development standards, however.

One of the key component uses in this "mix of uses" are public and semi-public uses. Specifically, a successful nodal development depends on constant populations. "Strip Development" occurs along major thoroughfares and intersections because there is a "constant population" occurring on the street in cars. In a confined defined area, this element is reduced or eliminated and therefore must be replenished using alternative approaches. Public uses (city hall, library, museums, county offices, state and federal offices) all provide a "daytime population". This type of "daytime population" is required for the success of commercial retail activities. A retail activity usually cannot succeed if patrons only visit in the evening and on weekends (after work). Similar relationships occur with "semi public uses" such as places of worship, high schools, colleges and universities (not elementary or middle schools), and hospitals.

Density – In order to create an urban form (even in a small setting), a departure from traditional "density" standards is recommended. Density standards that effectively limit residential and non residential standards are one of the underlying causes to "urban sprawl" with few to no amenities. In order for a City or a developer to be able to successfully amortize the

true cost of sustainable development, "more users" are required. The definition of "more users" means more residents and retailers in a given area. The northeast master plan town center proposes a variety of these land uses, including high density residential, mixed-uses and intense commercial centers. These land uses will combine to create a dense urban area in the Northeast area of El Paso. Downtown El Paso, San Antonio, Fort Worth, Houston, etc. are all great examples of dense urban forms – some are more successful than others, but the basic ingredients are common.

Public-Private Participation – The economic reality of nodal development is that although it makes more profit and fiscal sense, this type of development is more complicated than standard "strip retail". This complexity leads to a necessary partnership between the public and the private sides of land development. The "public side" of this participation generally includes cost sharing infrastructure. The "private side" of this participation generally includes adherence to a long-term plan and not just a short-term investment horizon. Both of these goals can be accomplished by careful intentional negotiations.

Open Spaces – In the local development market, developers have historically not reacted positively to "open spaces", since these areas are seen as a "cost to a development". More sophisticated models and developers view open spaces as part of the revenue side of the equation and not just the cost side. A straight forward example can best illustrate thusly:

50 acres or raw land
$20,000 per acre
$1,000,000 total cost of land
5.5 dwelling units per acre
275 total dwelling units
$3600 per lot for raw land
$5,000 per lot development costs
$5,000 per lot profit
$13,600 per lot retail (cost to builders)
$68,000 home (including lot)

2 acres of Open Space
$40,000 of cost for 2 acres
$60,000 of on-site improvements
$100,000 of open space cost
$360 per lot cost of open space

There is statistical evidence that consumers will pay a premium for certain criteria relative to their home purchases. These criteria include scenic views, proximity to good schools (especially elementary schools), landscaping, parks and open spaces, security and overall neighborhood quality (which can include architecture, historic nature, and other types of non tangible characteristics). Some economist and developers indicate that consumers will pay as much as 15% premiums for certain amenities. A conservative premium for these types of criteria is between 3% and 5% of the typical retail sales price for a similar home without these amenities. This equates to a premium of $2,040 to as high as $3,400 per home given the conditions listed above. At this rate, premiums paid by less than fifty (50) homes could pay for the total cost of the open space. Even if one assumes a diminishing premium return over the entire 275 home subdivision, not only will the home sales pay for the cost of open space, but the developer can realize additional net positive revenue.

National developers take advantage of these more sophisticated approaches and maximize their net profits. All master planned communities have "open spaces" built in to their pro-formas as a critical component of their land use mix. Amenity packages for more sophisticated developments include aquatic facilities, golf courses, recreation centers, hike & bike trails (in addition to those required by the local agencies), passive and active recreational venues, and an overall landscaping and theming package for the entire community. Providing "amenities" for the residents of the community helps with resale values, long-term sustainability and the overall quality of communities.

KEY INTERSECTIONS

Enhanced intersection design would help in adding identity to the area. This is important not only with the neighborhood design, but also with the critical linkages throughout the community.

Not at every intersection, but at the major intersections, changing the monotonous pavement by adding pavers or stamping the pavement could identify this intersection as "a place". Changing the pavement in the intersection is also recognized as a traffic calming measure and a pedestrian friendly design feature.

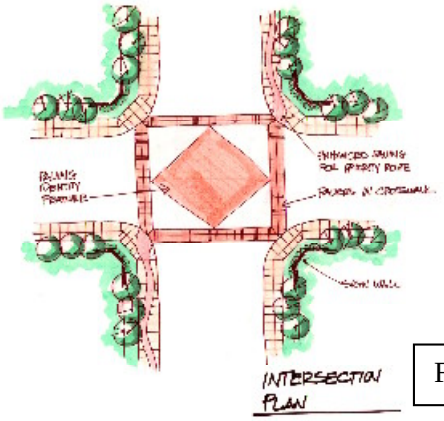

Figure 8.8

The City can also take advantage of intersection design and "place making" by programming the critical intersections surrounding the Town Center. For example, Proposed Master Plan Alternative Land Plan E proposes significant "roundabout" traffic circles. Note that these traffic circles are more than a simple "*cul de sac*" or turnaround. These roundabouts are both functional and of sufficient size to create a sense of place. Plates 18 through 19 illustrate the functionality as well as the community gathering context that can be developed.

In specific, there are two (2) distinct possibilities for the roundabouts that are being proposed. On the one extreme, the area could be designed like Dupont Circle in Washington D.C. or the Champs Elysees in France. These are public areas that are used for passive recreation:

- "Shakespeare in the Park"
- Street artists and performers
- Holiday celebrations and parades
- Walking gardens
- Xeriscaping test sites
- Tree farm for public uses

The other extreme that these traffic roundabouts could be used for are purely functional purposes. Each of the roundabouts is approximately eighteen (18) acres in size with a five hundred foot (500') radius. This area could be used for the following:

- Sun Metro Park & Ride Facility
- Community center with police sub-station
- Sun Metro "switching" station
- Smaller retail and office lease space
- Convention and Visitor's Bureau and/or other quasi public office space

PLATE 18 Section at Collector “P” Turnabout

PLATE 19 Section at Sean Haggerty Turnabout

MEDIANS AND PARKWAYS

Medians also help shape roadways by framing neighborhoods and providing a "safe haven" for pedestrian crossing. The landscaping does not have to be overly "lush"; rather, it only needs to have context and design. If the cost to landscape the entire median is too high, then one can consider only landscaping critical intersections and key intervals along the medians. The medians could be graded such that the drainage in a rainfall event does not run off, but rather collects in the medians to help sustain vegetation. Long term maintenance of these types of medians are often absorbed by either Home Owner's Associations, Business Districts (to improve quality and look of an area) or the local agency's street department. However, if such improvements are implemented in accordance to local conditions, long term maintenance can be minimized.

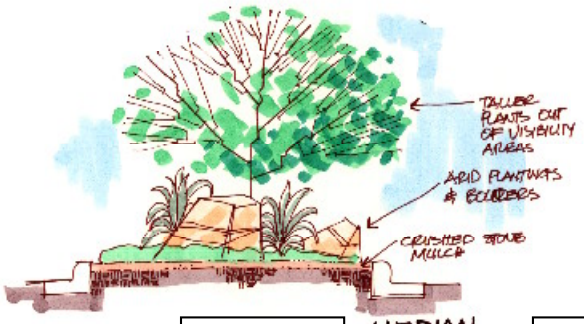

Figure 8.9

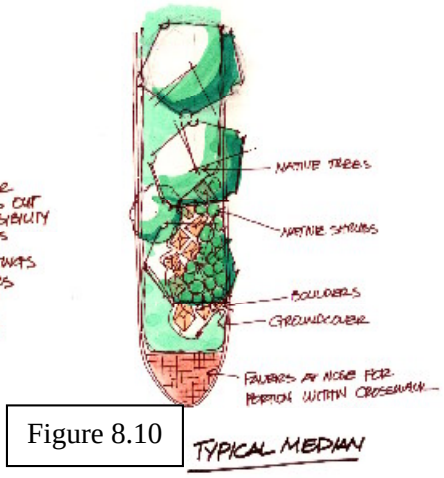

Figure 8.10

Standardizing the signage and light poles along the roadways and at the intersections will give the eventual neighborhoods identity and a sense of place. The light poles and street signs could be decorative in nature to provide the finished look of a master plan.

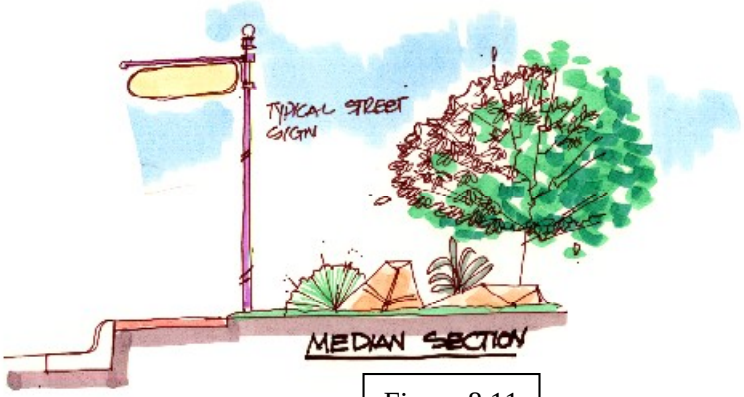

Figure 8.11

NORTHEAST PARKWAY

The TxDOT proposed Northeast Parkway (NEP) generalized alignment and historical background can be found in Chapter 4.0 (Public Policy) of the Existing Conditions Report. While coordinating with TxDOT, the alignment was modified slightly to the north and west of Painted Dunes golf course in order to avoid potential conflicts with existing EPWU water wells. TxDOT is currently in the schematic phase of the Northeast Parkway through the Northeast El Paso property. The current alignment of the NEP as recommended by this study can be found on the Development Constraints exhibit (Plate10) of the Existing Conditions Report.

The interchange locations of this parkway are critical to the subject property. Without key interchanges the Northeast Parkway will bisect this property isolating the northeast portion of the project from the rest of the project. The alignment shown in Plate #23 reflects the alignment at the time the Master Plan was prepared. TxDOT is currently in the schematic design phase and the final alignment may differ from what is shown. TxDOT has been willing to consider adding the interchange requested into their preliminary design. The ultimate decision on this will require continual coordination. Additionally, the preferred Master Plan Alternative Land Plan E has assumed an additional access point halfway between US Hwy 54 and McCombs along the NE Parkway.

The Master Plan Alternative Land Plan E anticipates non-residential development along the Northeast Parkway corridor. Although the anticipated uses are mostly office, light industrial and mixed-uses, there is some possibility for pure commercial-retail. However as stated previously, due to the lack of access roads (frontage roads) it is highly unlikely that the NE Parkway will be a significant commercial-retail corridor.

CO-LOCATION OF SCHOOLS AND PARKS

The City of El Paso has previously had success coordinating with the various school districts regarding co-locating park sites and school sites together. This co-development utilizes one parking facility and decreases the cost for both entities. The school districts would like to continue this practice on the subject property. A standard footprint for this development should be made to ensure facility coordination in the event one party is ready to develop and the other is not. If the cost agreement and the land dedication are predetermined the development will have a better chance for successful partnership.

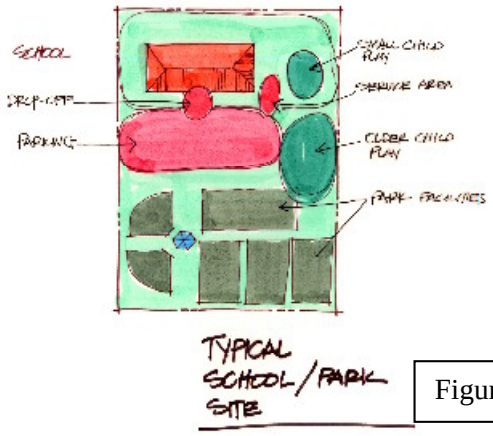

Figure 8.12

UTILITY CORRIDORS (EPNG GAS LINES)

The El Paso Company (formerly EPNG) has a facility located in Northeast El Paso, as well as high pressure gas lines located through the project site (see existing conditions report Plate 10 in Chapter 3.0 of the Existing Conditions Report). As previously described, the high pressure gas lines were installed prior to development in the northeast area. The pipe installed was not intended to accommodate development or high densities of people. If development occurs around these pipelines, the pipeline upgrades will be required by Federal Statute.

EPNG has explained that the cost of upgrading the pipes will be passed onto the developer or owner who caused the pipeline upgrade, and will not be the responsibility of the Gas Company. One solution to avoid this infrastructure conflict would be to route future golf course alignments (the retirement community golf course or any additions to Painted Dunes Golf Course) near the pipeline, and even cross the pipeline periodically. See Plate 21 in Chapter 9.0 for an example of how the golf course routes can be utilized to mitigate the EPNG gas lines.

EPNG has been receptive to this approach, but final consideration will need to be negotiated by EPWU and EPNG. The gas company has expressed favor with the solution of integrating the golf course with the pipeline to minimize the potential danger. This is similar in nature to the co-location of the EPNG pipelines at Champions Sports-Plex located on Zaragoza Road.

PAINTED DUNES

The Painted Dunes golf course facility is located on McCombs Blvd. north of US Hwy 54. There were plans to expand this golf course by an additional nine (9) holes but these plans have not come to fruition. There have also been plans by local developers to create a retirement community around this facility. If a retirement community is not developed at this location, some of the development community has voiced interest in building a subdivision around Painted Dunes.

The City of El Paso City Representative John Cook has led a committee to research the possibility/feasibility of a retirement community near the Painted Dunes Municipal Golf Course. As discussed in the Existing Conditions report a retirement community requires an adequate size, very specific programming and mix of uses. A typical retirement community (as developed by the national retirement community developers - Shea Development, Pulte, Dell Webb, Newland Communities and Woodbine Development) is between 600-1200 acres. These retirement communities contain additional amenities such as social recreation areas, active/passive recreation areas, trail systems, and community centers along with golf courses, aquatic facilities, tennis courts and other "active areas".

The existing Projected Land Use Plan and the "traditional approach" to development in the northeast limit the use around the Painted Dunes golf course. The developable area around Painted Dunes is limited by the EPNG gas lines, and the existing alignment of McCombs Blvd. There is not sufficient land around the Painted Dunes Golf Course to accommodate the needs of a true retirement community. The roadway network, EPNG facility and EPNG gas lines all limit the developable area around Painted Dunes. A retirement community might still be appropriate, but was unlikely that one would occur adjacent to Painted Dunes unless some of the constraints could be minimized.

Given that the local community was focused on a retirement community in this area, the consultant team therefore, developed a series of options that addressed these constraints. First, the consultant team proposed re-routing McCombs Blvd to better accommodate a potential retirement community. Second, although the area around Painted Dunes would ultimately have its own theme and development guidelines, still needed to have connectivity to the Town Center as well as context to the surrounding parcels. Therefore connections and land use transitions were developed to link the ultimate retirement community and the surrounding property. Lastly, the consultant team developed alternative plans to buffer the ultimate retirement community area from the EPNG facility as well as the existing high pressure gas lines. Utilizing future golf course routings, the consultant team negotiated an acceptable solution (to both the EPNG officials and EPWU) that allowed a golf course layout to act as a buffer between future residential development and the EPNG infrastructure.

Note that there is limited infrastructure near and around the Painted Dunes golf course and that the ultimate development of this area as a retirement community is dependent on the EPWU recruiting a willing partner. Developments of this type and magnitude are not commonplace. There are only a few developers that are willing and able to successfully implement these types of plans.

9.0 PROPOSED MASTER PLAN

The land study for the subject property originally yielded five (5) different Land Plan alternatives. Three (3) original alternatives ranged in complexity, style of land planning, and overall function. As the process evolved, a basic demographic and land use mix analysis was conducted for each alternative. From these alternatives, two (2) additional alternatives were developed as hybrids of various positive features of the original options. As the five (5) Land Plan alternatives were reviewed for various strengths and weaknesses, it became evident that the hybrid plans addressed more of the stakeholder concerns. Additionally, all stakeholders who voiced their opinions were clear on not wanting the final land plan to be a continuation of the typical development pattern which currently exists in the Northeast area. Stakeholders wanted to address community quality of life issues and help create a special place. (See Table 7.1 on page 16 for a list of stakeholder meetings.)

Ultimately, after a series of public input meetings, presentations to EPWU staff and presentations to the PSB and City Representatives, the proposed Master Land Plan Alternative E was selected. Utilizing a comparison matrix of various characteristics, Master Land Plan Alternative E addressed most stakeholder concerns, maximized the value to the PSB, and addressed the original objectives set forth by the EPWU staff. This plan seems to maximize the goals of the local community. A detailed cost analysis was prepared for proposed Master Land Plan E. The roadway costs and the stormwater system costs were calculated by the consultant team, while the water system, wastewater system, and reclaimed water system costs were calculated by the EPWU.

Specifically, Master Plan Alternative E addressed various goals including:

- Housing mix distribution
- Potential for a retirement community
- Phased development to coincide with PSB's infrastructure program
- Environmentally friendly
- Transition with the Franklin Mountains
- Provision for adequate public facilities (schools, parks, fire, police, etc.)
- Commercial/retail development
- Integration with the Northeast Parkway
- Transition and buffering of incompatible land uses

PROPOSED MASTER PLAN ALTERNATIVE E

Due to the decline of many American neighborhoods in the past fifty years, planners and engineers have increased their focus on sustainable design. Although the Clarence Perry theory of the Planning Unit was very popular, its engineering efficiency led to a lack of community cohesion and loss of sense of place. More recently, urban design professionals have accepted that function and form are critically linked and hence that land planning and transportation planning are integral in the creation of viable

neighborhoods. Proposed Master Plan Alternative E (Plate 20) proposes a sustainable mix of uses and relies heavily on the following principles:

- Creation of a "Town Center" with an identifiable center and edge
- Reservation of a retirement community integrated with the Painted Dunes golf course
- Linkages between key plan elements
- Concept of "Mixed-Use" versus homogenous single definition uses
- Use of open-spaces as a viable land use to increase value
- Creation of "super-pods" of development that encourage master planned communities
- Use of arterials to shape areas and create a dense urban core for economic development and sense of place.

This system puts less reliance on a formulaic approach and more on the creation of neighborhoods. There are strengths and challenges for this type of approach.

Urban Form: A roadway (arterial, collector, or local) is thought to have a singular function to move vehicles from one place to another. However, the road itself also has peripheral functions in terms of creating boundaries, view corridors, and definable spaces. This "new way of thinking" about roads stems from the acceptance that roads move people and not just vehicles. Therefore, the trip, the alignment, the corridor, etc., must all have a relationship to the person and not just the vehicle. *(2003 Neighborhood Street Design Guidelines ITE)*.

Proposed Master Plan Alternative E focuses on both the "capacity" of a roadway section as well as the underlying goal, which is the "movement of people", not just vehicles. This land plan alternative uses the arterials (major and minor) to frame a "Town Center" which can be a vibrant mixed use area for economic development as well as pedestrian oriented developments. However, collectors, urban collectors and linkages between development pods are also critical and therefore have been integrated into the plan.

Key roadways are "funneled" into the Town Center to create the necessary vehicle trips to sustain commercial activity, but the routes still remain on the periphery so as not to overpower the pedestrian experience. Examples of Town Centers in Texas that utilize this type of intricate planning are:

- El Paso's Downtown Plaza
- Ft. Worth's Sundance Square
- San Antonio's Riverwalk
- Austin's 6th Street and Congress Avenue

These places were created by both design and opportunity and are successful examples of an urban core that has a social function in addition to the physical function.

Mix of Land Uses: It is critical to note that proposed Master Plan Alternative E indicates a generalized mix of uses that includes residential, retail, commercial, office, industrial and others. This macro-level designation is intended as general guidelines for how the property could develop in order to create a sustainable community. Micro-level analysis however indicates that within any land use category there should be a mix of uses. This "mixing of uses" is especially critical for the residential neighborhoods. Residential development requires a corresponding amount of "neighborhood level services" for sustainable residential community functions.

A typical mix-use allocation for residential development includes the following:

Neighborhood zones:

- Public, Civic and Open Space 5-15%
- Neighborhood Services 2-10%
- Residential 75-93%

Even the "residential" uses should provide for a mix of residential types. Sustainable Neighborhood design principles indicate that residential subdivisions should contain at least four (4) different types of housing at four (4) different price points. This mix should include single family detached as well as single family attached and even limited multi-family units. This mix of uses allows for housing mobility as consumers evolve from entry level housing to "move-up" housing, luxury housing and eventually "empty nester" housing.

Each "neighborhood" is typically considered an area of 40 to 160 acres in size and provides at least one (1) neighborhood center. Sustainable developments provide for a mix of uses and activities including shopping, employment, schools, recreation and civic type uses. It is critical that these uses within the "neighborhood zones" be linked so that people of all ages and means can access all portions of the neighborhood by driving, walking or cycling.

Although land use mix is critical for commercial areas as well, this mix revolves around "tenant mix" more than overall mixes. A balance between "day time population" versus total amount of retail square feet is critical for market success. Quality primary retail depends on daytime customers to augment night and weekend activity. There are no calculations that explain the exact numbers required, but general observations are that there should be close to an equal amount of combined "office, commercial and industrial" square footage for any given number of retail (other than neighborhood service retail) square footage (within a trade area or within a non-residential development).

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The proposed Master Plan Alternative E proposes the following land use mix.

Residential Land Uses		
Low density residential	2,128 acres	maximum 4 du/acre
Medium density residential	4,372 acres	maximum 8 du/acre
High density residential	1,396 acres	maximum 20 du/acre
Non-Residential Land Uses		
Commercial	1,081 acres	
Mixed-use Retail	515 acres	
Mixed-use Office	1,373 acres	
Industrial	1,067 acres	
Open Space and Public		
School	431 acres	
Public Use	18 acres	
Park	521 acres	
Natural Transition Buffer	1,573 acres	

Transportation System: The existing City of El Paso's Master Thoroughfare Plan (MTP) solely focuses on "capacity of roadway" issues. This type of arterial system is not necessarily concerned with the impacts that roads have on land uses, quality of life issues, and overall aesthetics. Proposed Master Plan Alternative E utilizes the roadways to frame the specific land uses and create more useable, developer friendly tracts of land. However, these changes to the roadways require an update to the MTP.

This update is required due to Texas State Law and would be completed by City Staff. Neither the EPWU nor its consultants have the legitimate legal authority to initiate such a change in public City policy. An MTP update can require 60-90 days of technical analysis and an additional 60-90 days for the formal process (due to the legally required public input processes mandated by Chapter 213 of the Texas Local Government Code).

Due the revisions to the MTP and the realignment of roadways such as McCombs, Sean Haggerty, etc, the MPO's regional transportation model must be studied to ensure that the projected capacity is not compromised. This model analysis can be completed utilizing either TransCad or TranPlan. The MPO is typically charged with these types of analysis. The City of El Paso Planning Staff, in conjunction with the MPO modeling staff are currently studying the regional transportation plan. Note that the MPO model will need to be significantly adjusted to account for new arterial configurations, minor arterials, and collector road impacts.

Level-of-Service (LOS): Although Proposed Master Plan Alternative E proposes the re-alignment of some of the major arterials; the projected capacity is the same. In certain areas, the roadway sections are proposed to be reduced from arterial grade to commercial collector grade, but there will be an increase in the overall number of collector grade

roadways to mitigate any loss of arterial capacity. Ultimately, the goal of Proposed Master Plan Alternative E is to keep the same level-of-service as with the existing MTP. Early reactions from EPWU staff were that City Engineering, TXDoT and the MPO would not support any realignment of the roads. The consultant team has discussed the matter with each entity and has received general support from all three entities with the caveat of maintaining level of service.

The City and the MPO are studying the revised land use model and transportation system as mentioned earlier. *(Note that all the caveats and previous discussions are germane here as well. However, to avoid redundancy, they will not be restated.)*

Orderly Development: Proposed Master Plan Alternative E promotes orderly development as long as the EPWU is consistent with its land dispensation policy. This type of land use arrangement promotes both master planned communities of 500-1000 acres and small developments of 50-100 acres. However, please note that parceling the property up into small tracts of 100 acres or less will result in a fragmented pattern that most probably will lead to a lack of connectivity and a land pattern more akin to that which currently exists in Northeast El Paso.

The various "super-pods" created by Proposed Master Plan Alternative E can have different and unique development standards which are sensitive to their geographical location. For example, the areas adjacent to the Franklin Mountains can have development guidelines which reflect a resort-like foothill topography, density, view corridor, transportation linkage, and hike/bike trail system; whereas, the residential districts closer to the "Town Center" reflect a more urban style of development and mix of uses.

Proposed Master Plan Alternative E will likely encourage a faster pace of development since it will appeal to a variety of different types of developers, not just the standard traditional single-family developer. Note that Proposed Master Plan Alternative E can have both commercial and residential development occurring with relatively little offsite infrastructure investments. Proposed Master Plan Alternative E provides for residential development to occur adjacent to existing infrastructure.

Corridor Commercial: Proposed Master Plan Alternative E promotes some corridor development along US Hwy 54, but more importantly it creates a "Town Center". Instead of having "commercial" sized infrastructure stretching along every corridor, the larger water and sewer lines can be concentrated in the "Town Center". This is more efficient from a cost perspective, and it creates an environment which is attractive to office parks, commercial, and retail. However, small neighborhood commercial should be allowed within the medium and high density residential areas for support services per the city's comprehensive plan.

Note that due to market forces, the PSB will undoubtedly experience pressure to sell the land designated for the Town Center for residential development. For Proposed Master Plan Alternative E to be successful, it is critical for the PSB to land bank the property until the market matures sufficiently to justify the commercial/retail/office developments.

Retirement Community: Proposed Master Plan Alternative E provides more than 800 acres for the development of a retirement community around the Painted Dunes Golf Course. With the proposed realignment of McCombs Blvd, more land is now developable around the golf course. The ultimate retirement community is yet to be designed, but there is ample developable land for this to occur. Plate 21 illustrates a conceptual golf course layout integrated into a residential setting for a potential retirement community.

Resort Community: Previous iterations of the Master Plan proposed different alternatives which provided for a potential Resort Community in addition to a retirement community. The most optimum location for such a resort would be in the foothills of the Franklin Mountains in the northwestern area of the subject property. The challenge with this possibility becoming a reality is two-fold: 1) Adequate infrastructure planning - since it is so far into the future. If the plan is changed mid-stream, there will be significant impacts to the "developability" of this property. 2) Surrounding land uses – if the land uses around this area are not carefully monitored, a situation of incompatible land uses could develop and hence prevent this area from developing as a resort or any other high-end use.

Identity/Vision: Proposed Master Plan Alternative E creates super-pods including the "Town Center". As discussed earlier, each of the super-pods can have their unique development standards. Within these development standards, each super-pod can have its own identity and theme which encourages a unified development context. The Town Center will also have individual design criteria that are pedestrian friendly and encourage commercial/retail development.

Creating a "theme" for the property can be accomplished through zoning or through restrictive covenants (CC&R's). CC&R's are usually more restrictive and can accomplish more towards theming and design than zoning. Additionally, CC&R's have flexibility beyond zoning to address quality of life issues such as signage, theme, color, roof pitch, exterior finishing materials, mass, view corridors, site line studies, and general architectural style. However, the PSB would have to develop CC&R's and adopt them as part of the permanent record that runs with the land.

Costs of Proposed Master Plan Alternative E: Detailed cost analyses were not completed for each plan as noted previously. However, since Proposed Master Plan Alternative E received the most support by the stakeholders, general broad based costs were calculated for Proposed Master Plan Alternative E. These costs were developed as

a comparison to Proposed Master Plan Alternative A (which is the closest to a "no-build" alternative in this process).

Stormwater Infrastructure: See Chapter 10.0 of this report for a detailed analysis and discussion of the stormwater infrastructure costs.

Water Infrastructure: See Chapter 10.0 of this report for a detailed analysis and discussion of the stormwater infrastructure costs.

Sanitary Sewer Infrastructure: See Chapter 10.0 of this report for a detailed analysis and discussion of the stormwater infrastructure costs.

Reclaimed Water Infrastructure: See Chapter 10.0 of this report for a detailed analysis and discussion of the stormwater infrastructure costs.

Roadway Costs: The consultant team analyzed the cost of constructing the thoroughfare system as depicted in Proposed Master Plan Alternative E. The consultant team conducted this analysis for both the overall property as well as the "probable" phase I of the property. Note that Phase 1 is for approximately 5,809 acres and constitutes a thirty year build-out scenario. See Chapter 10 for the detailed roadway costs.

Relative to transportation issues, please note that neither a Traffic Impact Analysis nor a Master Thoroughfare Plan model analysis were a part of the scope for this study. However, in a parallel project, Jacobs Engineering conducted preliminary transportation studies for TXDOT that summarized the anticipated vehicle trips and the LOS. The study conducted by Jacobs Engineering is summarized in Exhibit 9.1. As one can see, many of the system roadways through the subject property are at LOS C or worse. The consultant team applied the data from the Jacobs' study to the signal timing software SYNCHRO. This software analyzed intersections to determine if any of the proposed land use patterns and/or roadway connections worsened the LOS as indicated in the Jacobs' study. No major intersection or roadway link was found to be any worse in the proposed land use plan than in the Jacobs' study as per the SYNCHRO model. As noted in the conclusion of the technical memorandum from the SYNCHRO model, "in summary these results should not discourage development, as these analysis are assumed to be with traffic at the worst conditions. The effect of traffic will be gradual over time where the depicted volumes may occur sometime after the year 2025." *(Ralph Martinez, P.E.)*

The full model discussion, outcomes, and technical summary can be found in the appendix. Please note that the results of the SYNCHRO model are solely based on the input data from the Jacobs' study since an independent transportation study to evaluate vehicle trips was not a part of the scope of this study.

EXHIBIT 9.1, JACOBS 2025 MTP LOS ANALYSIS

PLATE 20 Proposed Master Plan Alternative E

Plate 21 Conceptual Retirement Community Option 1

Plate 22 Conceptual Retirement Community Option 2

RECOMMENDED PLAN

After all analyses were conducted and stakeholder input was recorded, Proposed Master Plan Alternative E was modified for final adjustments. Plate 23 illustrates the final recommended plan.

This plan includes the major topics addressed in the narrative of Proposed Master Plan E and minor adjustments to land use mix, roadway alignments, etc.

Plate 23 Master Plan Land Uses

10.0 INFRASTRUCTURE ANALYSIS

DRAINAGE/STORM WATER MANAGEMENT SYSTEM

Conducting a detailed drainage analysis for each plan was both cost prohibitive and time prohibitive; therefore, a detailed analysis was only conducted for the Proposed Master Plan Alternative E. However, the consultant team did prepare an opinion of probable cost for the 1987 Northeast Master Drainage Plan prepared by Cardenas, Saucedo, and Associates (See Plate 24 and 25 and Table 10.1) which is as close to a "no build" scenario or the Proposed Master Plan Alternative A.

Table 10.1 Northeast El Paso Drainage Opinion of Probable Cost *(color coded)*

PIPE					
SECTION	**ITEM**	**QUANTITY**	**UNIT**	**COST**	**TOTAL**
	DESCRIPTION				
PG-1	60-inch pipe	7,500	LF	$150.00	$1,125,000
PG-2	60-inch pipe	5,200	LF	$150.00	$780,000
PG-3	60-inch pipe (4 segments	24,000	LF	$150.00	$3,600,000
	6000-feet ea.)				
PG-4	60-inch pipe (3 segments	4,200	LF	$150.00	$630,000
	1400-feet ea.)				
PG-5	60-inch pipe	3,500	LF	$150.00	$525,000
PG-6	60-inch pipe	3,600	LF	$150.00	$540,000
PG-7	60-inch pipe	1,400	LF	$150.00	$210,000
PY-1	60-inch pipe	17,900	LF	$150.00	$2,685,000
PY-2	10' x 10' boxes (3 @ 2000)	6,000	LF	$350.00	$2,100,000
PT-1	60-inch pipe	11,200	LF	$150.00	$1,680,000
PP-1	60-inch pipe	11,700	LF	$150.00	$1,755,000
	SUB-TOTAL				**$15,630,000**

POND EXCAVATION					
POND	**ITEM**	**QUANTITY**	**UNIT**	**COST**	**TOTAL**
	DESCRIPTION				
R-A1	Pond volume	1,221,067	CY	$3.00	$3,663,202
R-A2	Pond volume	267,878	CY	$3.00	$803,634
R-A3	Pond volume	681,278	CY	$3.00	$2,043,835
R-A4	Pond volume	1,427,639	CY	$3.00	$4,282,916
R-G1	Pond volume	647,334	CY	$3.00	$1,942,002
R-G2	Pond volume	78,505	CY	$3.00	$235,514
R-H1	Pond volume	2,960,789	CY	$3.00	$8,882,368
	SUB-TOTAL				**$21,853,471**
CONCRETE CHANNEL					
SEGMENT	**STA - STA**	**QUANTITY**	**UNITS**	**COST**	**TOTAL**
RDA	0+00 - 8+50	850	LF	$300.00	$255,000
RDB	10+00 - 30+50	2,050	LF	$285.00	$584,250
RDC	32+00 - 45+00	1,300	LF	$200.00	$260,000
RD1A	0+00 - 1+00	100	LF	$285.00	$28,500
RD1B	2+00 - 16+00	1,400	LF	$200.00	$280,000
RD1C	17+00 - 30+50	1,350	LF	$200.00	$270,000
RD2A	0+00 - 5+75	575	LF	$285.00	$163,875
RD2B	7+25 - 11+50	425	LF	$285.00	$121,125
RD2C	12+50 - 26+50	1,400	LF	$285.00	$399,000
RD2D	27+50 - 41+00	1,350	LF	$200.00	$270,000
RD3	3300'	3,300	LF	$300.00	$990,000
RD4	2400'	2,400	LF	$300.00	$720,000
	SUB-TOTAL				**$4,341,750**

BOX CULVERT					
CULVERT	**ITEM**	**QUANTITY**	**UNITS**	**COST**	**TOTAL**
	DESCRIPTION				
RD-D	9' x 6' B.C. (2 ea. @ 150)	300	LF	$225.00	$67,500
RD-E	8' x 5' B.C.	150	LF	$200.00	$30,000
RD-F	8' x 4' B.C.	150	LF	$180.00	$27,000
RD1-D	6' x 6' B.C. (2 ea. @ 100)	200	LF	$175.00	$35,000
RD1-E	8' x 5' B.C.	100	LF	$200.00	$20,000
RD1-F	8' x 5' B.C.	150	LF	$200.00	$30,000
RD2-E	6' x 6' B.C. (2 ea. @ 150)	300	LF	$175.00	$52,500
RD2-F	6' x 6' B.C. (2 ea. @ 100)	200	LF	$175.00	$35,000
RD2-G	8' x 6' B.C.	100	LF	$215.00	$21,500
RD2-H	8' x 4' B.C.	150	LF	$180.00	$27,000
	SUB-TOTAL				**$345,500**
	TOTAL DRAINAGE				**$42,170,721**

- THIS OPINION OF PROBABLE DRAINAGE COSTS IS BASED ON 2004 UNIT COSTS AND THE MASTER PLAN FOR
- THE 1987 NORTHEAST MASTER DRAINAGE PLAN. QUANTITIES FOR PONDING AREAS WERE BASED ON THE HEC-1
- MODELING INPUT DATA. ALL OTHER QUANTITIES WERE DERIVED FROM THE MASTER DRAINAGE PLAN.

PLATE 24 Northeast El Paso Drainage Concept Pipes

PLATE 25 Northeast El Paso Drainage Concept Channels Plan

Hydrologic Analysis

A detailed hydrologic model for existing conditions was prepared to evaluate any changes that could impact the Green Belt Levee and eventually the Northeast Pond No. 1 since the previous CLOMR in 1987. All watershed boundaries were coded as undeveloped except for the North Hills Development. This study also includes the Western Freeway channel and the Eastern Freeway channel. The previous study indicated a discharge of 11,041 cubic feet per second (cfs) for a 100-year flood at the Green Belt Levee. The current study indicates a discharge of 11,660 cfs for a 100-year flood at the same confluence point. Watershed boundaries are illustrated on Plate 26.

The downstream flood control improvements- Green Belt Levee and the Northeast Pond No. 1- will not receive any flood relief. It is the position of the City of El Paso that several unknown factors have contributed to the possible reduction of pond capacity at the Northeast Pond No. 1. The City of El Paso has requested a reduction of storm water runoff at the Green Belt Levee to offset the concerns of flood control management at the pond.

The “No Build” Scenario will continue to follow the same drainage characteristics and provide no relief to the City of El Paso’s downstream flood control improvements. It is important to note that the “No Build” option will impede proceeding with development and will result in unrealistic land plan efforts.

PLATE 25 FLOOD ZONE MAP

Plate 26 – NE Land Study Watershed Boundaries

Proposed Master Plan Alternative E1 – Drainage Analysis

The detailed drainage analysis for Proposed Master Plan Alternative E1 assesses full build-out conditions. Several detailed analyses were conducted to study how to best manage the stormwater system demands for the final plan.

This stormwater system alternative incorporates structural features and land use designations for Proposed Master Plan Alternative E (Stormwater Alternative E1). As a part of this alternative, six flood control facilities with appropriate outlet structures and a conveyance structure along McCombs Blvd. were incorporated. All the proposed flood control improvements are located within the project boundary of Phase 1 (approx. 5,809 - acres). The location of these flood control facilities are shown on Plate 27.

The objective for the development of Stormwater Alternative E1 is to release storm water runoff at slower peak periods to reduce the peak discharge at critical locations. The development of this system frequently results in a reduction of size/capacity of the downstream flood control facilities. The Stormwater Alternative E1 only focused on developing a drainage system for the 5,809-acre project area. It must be noted that all areas outside of the 5,809-acre project area boundary that contribute to the project area were considered under developed conditions, but the storm water runoff was "passed through" to the Green Belt Levee. The upstream "pass through" runoff results in very large flood control conveyance structures. Refer to Plate 26 for the watershed boundary exhibit with the associated runoff rates.

This alternative proposes detention facilities throughout the project area with outlet structures varying from 36" to 60" Reinforced Concrete Pipes (RCP). The locations of the facilities were placed at strategic locations to decrease the size of crossing structures or the length of the outlet structures. A series of detention ponds were placed at the foothills of the Franklin Mountains; the intent was to minimize the conveyance structure and to reclaim the downstream property from the Special Flood Hazard Area (SFHA). The intermediate flood control facilities accept the upstream "bleeder lines" runoff and intercept the adjacent developed storm water runoff. The flood control structures were analyzed and sized for developed conditions as identified in the appropriate land use plan.

A summary of the flood control facilities is listed in the following table.

TABLE 10.2: Detention Facilities E1

BASIN ID	AREA (ft^2)	VOLUME (ac-ft)	OUTLET STRUCTURE	Q_{in}(cfs)	Q_{out}(cfs)
DB-1	372100	140.822	1-60" Pipe	1,822	106
DB-2	302500	115.293	1-60" Pipe	1,100	176
DB-3	422500	177.258	1-60" Pipe	1,965	281
DB-4	202500	66.774	1-60" Pipe	1,338	314
DB-5	2772225	441.490	1-36" Pipe	1,643	77
DB-7	144400	30.208	1-42" Pipe	1,072	110

The use of a combination park/pond (DB-5), as per the Proposed Master Plan Alternative E, is the largest flood control facility of the system with a surface area of 63.6 acres. As a result, the flood control structure was 5 feet deep with side slopes designed to accommodate a more frequent recurring storm water event without disturbing normal park activities. Since hydraulic analysis was not part of the scope for this study, analyses were limited to open channel conditions. This leaves a bottom area of 43.6 acres which is sufficient area for park use. The capacity of the channels was obtained from Manning's open channel equation ($1.486/n\ AR^{2/3}S^{1/2}$).

The following table provides additional information on the proposed conveyance structures for this alternative.

TABLE 10.3: Conveyance Structures Drainage Analysis E1

CHANNEL	BOTTOM WIDTH (ft)	DEPTH (ft)	SIDE SLOPES	LENGTH (ft)	Q_{100} (ft^3/s)
McCombs Road					
R-8	20	12	1:1	2000	7,984
R-13	20	12	1:1	4000	8,209
R-18	20	12	1:1	4000	8,636
Tributary Channels					
R-17	10	5	1:1	5800	1,643
R-29	8	5	1:1	4000	1,330
R-25	5	3	1:1	3000	416

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Plate 27 NE Land Study Proposed Master Drainage Plan E1

Alternative E2

This alternative consists of the same flood control facilities included in Alternative E1; however, in an attempt to reduce the size of the conveyance structure along McCombs Blvd, four flood control facilities with appropriate outlet structures were added outside of the Land Study boundary area for Phase 1. The locations of these additional facilities are displayed in Plate 28. These facilities are from the previous CLOMR study dated December, 1987.

The primary reason for analyzing flood control facilities outside of the land study boundary is the significant amount of storm water runoff being generated from the north-east contributing watersheds. At the direction of the EPWU, the consultant prepared this drainage analysis to compare the benefits of implementing off-site improvements immediately north of the subject project area. As a result of the upstream improvements, the facilities reduced the size of the conveyance structures; however, the benefit was not as great due to approximately 3,320 cfs contributing from the most northern watershed area. Refer to Alternative E3 for further drainage analysis of the entire area.

The following table includes the four additional flood control facilities and changes to the previous flood control facilities.

TABLE 10.4: Detention Facilities Drainage Analysis E2

BASIN ID	AREA (ac.)	VOLUME (ac-ft)	OUTLET STRUCTURE	Q_{in}(cfs)	Q_{out}(cfs)
DB-1	8.54	140.822	1-60” Pipe	1,822	106
DB-2	6.94	115.293	1-60” Pipe	1,100	176
DB-3	9.70	177.258	1-60” Pipe	1,965	281
DB-4	4.65	66.774	1-60” Pipe	1,338	314
DB-5	63.64	441.490	1-36” Pipe	1,643	77
DB-7	6.94	30.208	1-60” Pipe	1,072	110
RA-2	Not specified	166.03	4-60” Pipes	1,955	603
RA-3	Not specified	422.27	1-60” Pipe	1,958	202
RA-4	Not specified	884.8	1-60” Pipe	1,338	200
RH-1	Not specified	1835.1	1-60” Pipe	1,614	184

The following table reflects changes in the conveyance structure along McCombs Blvd.

TABLE 10.5: Conveyance Structures Drainage Analysis E2

CHANNEL	BOTTOM WIDTH (ft)	DEPTH (ft)	SIDE SLOPES	LENGTH (ft)	Q_{100} (ft^3/s)
McCombs Road					
R-8	20	10	1:1	2000	5,186
R-13	20	10	1:1	4000	5,924
R-18	20	10	1:1	4000	5,627
Tributary Channels					
R-17	10	5	1:1	5800	1,641
R-29	8	5	1:1	4000	1,330
R-25	5	3	1:1	3000	416

Plate 28 NE Land Study Proposed Master Drainage Plan E2

Alternative E3

This alternative includes all flood control facilities of Alternative E2 (and hence those of Alternative E1 as well); however, in an attempt to further reduce the size of the flood control conveyances structure along McCombs Blvd, three additional flood control facilities were added to the system. The locations of these facilities are shown in Plate 29. A schematic diagram of the HEC-1 model has been included in the appendix for this analysis. The three additional facilities, as well as any changes to the improvements previously discussed in E2 are detailed in the following table.

TABLE 10.6: Detention Facilities Drainage Analysis E3

BASIN ID	AREA (ac.)	VOLUME (ac-ft)	OUTLET STRUCTURE	Q_{in}(cfs)	Q_{out}(cfs)
DB-1	8.54	140.822	1-60" Pipe	1,822	106
DB-2	6.94	115.293	1-60" Pipe	1,100	176
DB-3	9.70	177.258	1-60" Pipe	1,965	282
DB-4	4.65	66.774	1-60" Pipe	1,338	314
DB-5	63.64	441.490	1-36" Pipe	1,641	77
DB-7	9.70	30.208	1-60" Pipe	1,072	110
RA-2	Not specified	166.03	4-60" Pipes	1,952	597
RA-3	Not specified	422.27	1-60" Pipe	1,273	201
RA-4	Not specified	884.8	1-60" Pipe	1,938	200
RH-1	Not specified	1835.1	1-60" Pipe	1,614	184
DB-13	14.69	342.823	1-60" Pipe	3,292	291
DB-14	5.74	89.532	1-60" Pipe	1,035	185
DB-15	6.94	115.293	1-60" Pipe	1,429	161

Please note, this drainage analysis extended beyond the original scope of work project boundary, but in order to develop the most comprehensive Master Drainage Plan for the area and to develop a cost estimate for each of the alternatives for comparison, the entire area needed to be analyzed. The three additional flood control facilities were analyzed to control the amount of storm water runoff generated by this watershed. The upstream facilities had a positive impact on the size of conveyance structures, and in return a reduction in cost of these facilities. All the facilities in the previous alternatives are still in effect with Alternative E-3. All the watersheds were analyzed as developed conditions to conform to the proposed land use plan. Any changes to flood conveyance structures are featured in the following table.

TABLE 10.7: Conveyance Structures Drainage Analysis E3

CHANNEL	BOTTOM WIDTH (ft)	DEPTH (ft)	SIDE SLOPES	LENGTH (ft)	Q_{100} (ft^3/s)
McCombs Road					
R-8	20	8	1:1	2000	2,952
R-13	20	8	1:1	4000	3,300
R-18	20	9	1:1	4000	3,790
Tributary Channels					
R-17	10	5	1:1	5800	1,641
R-29	8	5	1:1	4000	1,330
R-25	5	3	1:1	3000	416

Plate 29 NE Land Study Proposed Master Drainage Plan E3

Description of Study Methods

This study includes analysis of four conditions:

- Existing conditions as presented in previous study (Cardenas Saucedo and Associates)
- Alternative E1 conditions , as defined previously;
- Alternative E2 conditions, as defined previously;
- Alternative E3 conditions, as defined previously.

The watershed delineations were extended beyond the study area to accurately determine the existing flow rates at the Green Belt Levee. The watershed/drainage areas are shown on base maps prepared from 7-1/2 minute quadrangles (U.S.G.S. Topographic Maps). The following table describes the lag times used for each watershed for each alternative.

TABLE 10.8: Previous CLOMR-Watershed Lag Times

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-1	2.975	3.769	181.513	0.7074
WS-2	2.076	2.057	578.035	0.4319
WS-3	1.213	0.648	1154.163	0.2517
WS-4	0.728	0.094	192.308	0.2400
WS-5	1.952	2.996	553.279	0.4156
WS-6	2.114	1.604	501.419	0.4498
WS-7A	0.5685	0.1403	123.131	0.2165
WS-7B	1.108	0.681	144.43	0.3488
WS-8A	0.304	0.327	197.433	0.1230
WS-8B	1.315	1.44	98.874	0.4269
WS-9A	0.502	0.439	238.949	0.1736
WS-9B	1.022	0.666	156.586	0.3230
WS-10A	0.477	0.1895	314.334	0.1586
WS-10B	1.043	0.5095	153.448	0.3293
WS-11	1.094	0.324	155.393	0.3406
WS-12	1.117	0.67	179.051	0.3369
WS-13	1.075	0.706	279.07	0.3008

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-14	1.179	0.595	63.613	0.4272
WS-15	2.458	2.083	33.767	0.8423
WS-16	2.08	1.418	55.288	0.6755
WS-17	2.104	1.373	66.54	0.6579
WS-18A	0.7789	0.3701	96.29	0.2882
WS-18B	0.8267	0.6283	66.5296	0.3235
WS-18C	0.4197	0.4964	71.48	0.1906
WS-19A	1.606	1.1848	34.2466	0.6079
WS-19B	0.3297	0.1214	3.033	0.2892
WS-20	0.644	0.18	54.348	0.2780
WS-21	2.029	1.006	34.5	0.7250
WS-22	3.044	2.027	354.796	0.6338
WS-23A*		0.4870		0.1800
WS-23B*		0.4793		0.2200

***Information taken from CLOMR dated December 1987.**

TABLE 10.9: Alternative E1-Watershed Lag Times

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-1	2.975	3.769	181.513	0.7074
WS-2	2.076	2.057	578.035	0.4319
WS-3	1.213	0.648	1154.163	0.2517
WS-4	0.728	0.094	192.308	0.2400
WS-5	1.952	2.996	553.279	0.4156
WS-6	2.114	1.604	501.419	0.4498
WS-7A	0.5685	0.1403	123.131	0.1443
WS-7B	1.108	0.681	144.43	0.2325

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-8A	0.304	0.327	197.433	0.0820
WS-8B	1.315	1.44	98.874	0.2846
WS-9A	0.502	0.439	238.949	0.1158
WS-9B	1.022	0.666	156.586	0.2153
WS-10A	0.477	0.1895	314.334	0.1057
WS-10B	1.043	0.5095	153.448	0.2195
WS-11	1.094	0.324	155.393	0.2271
WS-12	1.117	0.67	179.051	0.2246
WS-13	1.075	0.706	279.07	0.2005
WS-14	1.179	0.595	63.613	0.2848
WS-15	2.458	2.083	33.767	0.5615
WS-16A	1.6322	1.234	61.267	0.3674
WS-16B	0.4441	0.1836	22.517	0.1652
WS-17A	1.5823	0.9328	75.839	0.3445
WS-17B	0.5212	0.4405	38.373	0.1686
WS-18A	0.7789	0.3701	96.29	0.1921
WS-18B	0.8267	0.6283	66.5296	0.2156
WS-18C	0.4197	0.4964	71.48	0.1271
WS-19A	1.606	1.1848	34.2466	0.4052
WS-19B	0.3297	0.1214	3.033	0.1928
WS-20	0.644	0.18	54.348	0.1854
WS-21	2.029	1.006	34.5	0.4834
WS-22A	1.7878	1.268	27.967	0.4569
WS-22B	1.2563	0.3833	31.8395	0.3409
WS-22C	0.4767	0.1647	35.6618	0.1598

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-22D	0.6492	0.2154	38.5089	0.1991
WS-23A*		0.4870		0.1800
WS-23B*		0.4793		0.2200

***Information taken from previous CLOMR dated December 1987.**

TABLE 10.10: Alternative E2-Watershed Lag Times

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-1	2.975	3.769	181.513	0.7074
WS-2	2.076	2.057	578.035	0.4319
WS-3	1.213	0.648	1154.163	0.2517
WS-4	0.728	0.094	192.308	0.2400
WS-5	1.952	2.996	553.279	0.4156
WS-6	2.114	1.604	501.419	0.4498
WS-7A	0.5685	0.1403	123.131	0.1443
WS-7B	1.108	0.681	144.43	0.2325
WS-8A	0.304	0.327	197.433	0.0820
WS-8B	1.315	1.44	98.874	0.2846
WS-9A	0.502	0.439	238.949	0.1158
WS-9B	1.022	0.666	156.586	0.2153
WS-10A	0.477	0.1895	314.334	0.1057
WS-10B	1.043	0.5095	153.448	0.2195
WS-11	1.094	0.324	155.393	0.2271
WS-12	1.117	0.67	179.051	0.2246
WS-13	1.075	0.706	279.07	0.2005
WS-14	1.179	0.595	63.613	0.2848
WS-15A	0.9239	0.9785	75.766	0.2289

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-15B	1.5441	1.1049	16.191	0.4535
WS-16A	1.6322	1.234	61.267	0.3674
WS-16B	0.4441	0.1836	22.517	0.1652
WS-17A	1.5823	0.9328	75.839	0.3445
WS-17B	0.5212	0.4405	38.373	0.1686
WS-18A	0.7789	0.3701	96.29	0.1921
WS-18B	0.8267	0.6283	66.5296	0.2156
WS-18C	0.4197	0.4964	71.48	0.1271
WS-19A	1.606	1.1848	34.2466	0.4052
WS-19B	0.3297	0.1214	3.033	0.1928
WS-20	0.644	0.18	54.348	0.1854
WS-21	2.029	1.006	34.5	0.4834
WS-22A	1.7878	1.268	27.967	0.4569
WS-22B	1.2563	0.3833	31.8395	0.3409
WS-22C	0.4767	0.1647	35.6618	0.1598
WS-22D	0.6492	0.2154	38.5089	0.1991
WS-23A*		0.4870		0.1800
WS-23B*		0.4793		0.2200

***Information taken from previous CLOMR dated December 1987**

TABLE 10.11: Alternative E3-Watershed Lag Times

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-1	2.975	3.769	181.513	0.7074
WS-2A	2.076	1.4332	578.035	0.4319
WS-2B	0.8882	0.5593	472.868	0.2353
WS-3	1.213	0.648	1154.163	0.2517

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-4	0.728	0.094	192.308	0.2400
WS-5	1.952	2.996	553.279	0.4156
WS-6	2.114	1.604	501.419	0.4498
WS-7A	0.5685	0.1403	123.131	0.1443
WS-7B	1.108	0.681	144.43	0.2325
WS-8A	0.3145	0.2308	190.779	0.1270
WS-8B	1.2578	0.9415	86.22	0.2824
WS-8C	0.4239	0.1255	235.905	0.1020
WS-8D	1.0085	0.4074	178.483	0.2079
WS-9A	0.502	0.439	238.949	0.1158
WS-9B	1.022	0.666	156.586	0.2153
WS-10A	0.477	0.1895	314.334	0.1057
WS-10B	1.043	0.5095	153.448	0.2195
WS-11	1.094	0.324	155.393	0.2271
WS-12	1.117	0.67	179.051	0.2246
WS-13	1.075	0.706	279.07	0.2005
WS-14	1.179	0.595	63.613	0.2848
WS-15A	0.9239	0.9785	75.766	0.2289
WS-15B	1.5441	1.1049	16.191	0.4535
WS-16A	1.6322	1.234	61.267	0.3674
WS-16B	0.4441	0.1836	22.517	0.1652
WS-17A	1.5823	0.9328	75.839	0.3445
WS-17B	0.5212	0.4405	38.373	0.1686
WS-18A	0.7789	0.3701	96.29	0.1921
WS-18B	0.8267	0.6283	66.5296	0.2156

Watershed Label	Length (mi)	Area (mi^2)	Slope (ft/mi)	Lag (hr)
WS-18C	0.4197	0.4964	71.48	0.1271
WS-19A	1.606	1.1848	34.2466	0.4052
WS-19B	0.3297	0.1214	3.033	0.1928
WS-20	0.644	0.18	54.348	0.1854
WS-21	2.029	1.006	34.5	0.4834
WS-22A	1.7878	1.268	27.967	0.4569
WS-22B	1.2563	0.3833	31.8395	0.3409
WS-22C	0.4767	0.1647	35.6618	0.1598
WS-22D	0.6492	0.2154	38.5089	0.1991
WS-23A*		0.4870		0.1800
WS-23B*		0.4793		0.2200

***Information taken from previous CLOMR dated December 1987**

The hydrologic analysis was performed using computer software developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC-1). The HEC-1 Flood Hydrograph Package was used to model hydrographs for each component of the system. Precipitation data was obtained from the U.S. Department of Commerce, Weather Bureau, Technical Paper No. 40 (TP-40)- Rainfall Frequency Atlas of the United States (May, 1961). The depth duration data for the 100-year flood events is shown in Table 10.12. All drainage analysis and preliminary sizes were based on the 100-year storm event.

TABLE 10.12 Precipitation Input Data

	Duration Depth, Inches							
Flood Frequency	5-min	15-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
100-yr.	0.61	1.19	1.95	2.35	2.50	2.95	3.45	3.90

HEC-1 Model Parameters

The drainage methodology for the northeast area has been established by previous drainage studies performed in the study area. The drainage criteria to be used in the study area, as documented in the Northeast Hydrologic Investigation Report prepared by Espey, Huston & Associates, are listed below:

- Basin lag times based on length, overall basin slope; and geometric coefficient

- Geometric coefficient factor, Kn, varies from 0.03 to 0.06 depending on the degree of urbanization within the watershed.

- Loss Analysis for the area was based on loss rates in the Albuquerque District for the U.S. Army Corps of Engineers. The loss rates for drainage analysis are 0.50 inches initial loss and 0.25 inches per hour for loss rates in the mountain areas and 0.80 inches initial loss with 0.40 inches per hour for the plain regions. The following table summarizes the land use loss rates.

TABLE 10.13: Loss Rates

LAND USE	DESCRIPTION	% IMPERVIOUS	INITIAL LOSS	UNIFORM LOSS
M	Mountain	0	0.50	0.25
F	Alluvial Fan	0	0.80	0.40
U1	Low Density Residential	20	0.65	0.32
U2	Medium Density Residential	40	0.50	0.25
U3	High Density Residential	60	0.32	0.16
U4	Business Commercial	90	0.10	0.05
U5	Light Industrial	90	0.10	0.05

- Infiltration losses separated into impervious and pervious portions. Impervious rates vary from 25-percent to 35-percent impervious.

- Infiltration rate of 0.02 inches per hour.

- Channel routing of hydrograph uses modified plus for the reaches.

- Manning “n” values for undeveloped areas vary from 0.045 to 0.070 and for channels the “n” values range from 0.015 to 0.017.

- Water surface elevations in pond areas were established by applying runoff to volume-stage relationships.

Hydrology Results

The study model developed hydrographs for each of the system’s components. The computer input and output for each model is presented in Appendix (insert label). Computed discharges at selected locations for each alternative are shown for its respective Exhibit.

The following table compares the discharge at the Green Belt Levee for the existing condition and the three alternatives.

TABLE 10.14: Discharge Comparison

	Discharge, Q (cfs) at Green Belt Levee
Existing Conditions	11,993
Alternative E	12,491
Alternative E2	9,771
Alternative E3	8,584

Drainage Infrastructure Cost

The tabulations used to compute the costs for the proposed drainage improvements are included in the Appendix. The drainage costs associated with each alternative are summarized below in Table 10.15. See Appendix for a detailed cost of the drainage infrastructures.

TABLE 10.15: Drainage Infrastructure Cost

	FLOOD CONTROL COST	LAND VALUE	OFF-SITE IMPROVEMENTS	TOTAL
Previous CLOMR	$54,566,221	$5,820,000	N/A	$60,386,221
Alternative E	$35,645,731	$1,940,000	N/A	$37,585,731
Alternative E2	$36,207,540	$2,040,000	$11,413,302	$49,660,842
Alternative E3	$68,619,450	$2,100,000	$14,170,029	$84,889,479

It is important to note that the previous CLOMR for the study area did not take into account the most northern watersheds. A significant amount of storm water runoff from watersheds is a major component of the impacts to the downstream areas. Note that it is not appropriate to evaluate the four alternatives and derive a direct cost-based conclusion. Each alternative has a distinct set of criteria that call for a policy decision and not a pure cost-based decision. For example, although Alternative E3 costs more than any other solution, it is the most efficient and comprehensive approach relative the overall development of the entire property. This approach can be coordinated early on with TXDOT relative to the NE Parkway alignment, its drainage, cut/fill dirt quantities, etc. Additionally, the "Previous CLOMR" alternative did not consider many of the assumptions that were included in the other three approaches. The consultant team does not intend for this cost analysis to be the basis for a decision. The decision as to how to manage the stormwater is based on a long-term planning policy decision that ultimately is rooted in the PSB objectives. If the PSB selected to implement Alternative E due to a cost-basis rationale, the net result would be greater infrastructure costs in the future. Due to the limited project limits of Alternate E, the true costs of effectively managing the stormwater demands are being deferred not eliminated.

Drainage Infrastructure Phasing

The implementation of the drainage infrastructure as well as the implementation of water and sewer facilities will dictate the economic feasibility of the development of the land. Based on the infrastructure necessary to implement to develop the land within the study area, it appears the infrastructure will be in conformance to the proposed phasing plan

included in this report. It must be noted that the area within the vicinity of the existing Painted Dunes Golf Course and the upstream corridor may pose a drainage issue to convey all the upstream runoff without upstream flood control relief. These are some of the issues EPWU must consider at the time of releasing land for sale; infrastructure of this magnitude may affect the unit price of the land. EPWU must be sensitive to allow off-site improvements to be constructed, which will have a positive result to downstream facilities. As a result of these off-site improvements, the unit price of the downstream properties may increase; however, the flood zone boundaries have not been approved by FEMA and thus, the area has not been physically removed from the flood zone. A major selling point to developers, and a potential increase in value, is obtained upon verification from FEMA of a CLOMR approval.

ROADWAY COSTS

Table 10.16 illustrates the anticipated costs for the Proposed Master Thoroughfare Plan E. Please note that although a cost analysis was developed for the Proposed Master Thoroughfare Plan A (the "no build scenario"), the EPWU directed that all cost analysis only focus on the proposed plan E.

Table 10.16 illustrates the anticipated costs for Proposed Master Thoroughfare Plan E.

TABLE 10.16: Cost of Proposed Master Thoroughfare Plan

DESCRIPTION	ROADWAY TYPE	LANES	R.O.W. WITH	LINEAR FEET OF ALIGNMENT	COST PER LINEAR FEET	LINEAR FOOT COST LOW	LINEAR FOOT COST HIGH	
					Low	High		
Total Super Arterial Street with Bike Lanes	Super Arterial	8	146	43,359	$ 700.00	$ 900.00	$ 30,351,300.00	$ 39,023,100.00
Total Major Arterial Street	Major Arterial	6	110	24,968	$ 525.00	$ 650.00	$ 13,108,026.75	$ 16,228,985.50
Total Minor Arterial Street	Minor Arterial	4	76	83,677	$ 325.00	$ 425.00	$ 27,195,125.75	$ 35,562,856.75
Total Collector Street	Collector	4	64	176,441	$ 225.00	$ 325.00	$ 39,927,017.75	$ 57,343,386.75
Totals				328,445			**$ 110,581,470.25**	**$ 148,158,329.00**
Collector A	Collector	4	64	18,582	$ 225.00	$ 325.00	$ 4,180,950	$ 6,039,150
Collecotr B	Collector	4	64	8,652	$ 225.00	$ 325.00	$ 1,946,626	$ 2,811,793
Collector C	Collector	4	64	17,070	$ 225.00	$ 325.00	$ 3,840,750	$ 5,547,750
Collector D	Collector	4	64	2,478	$ 225.00	$ 325.00	$ 557,550	$ 805,350
Collector D (Town Center)	Collector (Modified)	4	82	3,055	$ 250.00	$ 325.00	$ 763,750	$ 992,875
Collector E	Collector	4	64	3,139	$ 225.00	$ 325.00	$ 706,275	$ 1,020,175
Collector E (Town Center)	Collector (Modified)	4	82	1,000	$ 250.00	$ 325.00	$ 250,000	$ 325,000
Collector F	Collector	4	64	6,298	$ 225.00	$ 325.00	$ 1,417,050	$ 2,046,850
Collector G	Collector	4	64	19,628	$ 225.00	$ 325.00	$ 4,416,300	$ 6,379,100
Collector H	Collector	4	64	6,016	$ 225.00	$ 325.00	$ 1,353,600	$ 1,955,200
Collector I (Town Center)	Collector (Modified)	4	82	2,530	$ 225.00	$ 325.00	$ 569,250	$ 822,250
Collector J (Town Center)	Collector (Modified)	4	82	14,862	$ 225.00	$ 325.00	$ 3,343,950	$ 4,830,150
Collector K	Collector	4	64	2,859	$ 225.00	$ 325.00	$ 643,275	$ 929,175
Collector K (Town Center)	Collector (Modified)	4	82	1,000	$ 250.00	$ 325.00	$ 250,000	$ 325,000
Collector L (Town Center)	Collector (Modified)	4	82	1,000	$ 225.00	$ 325.00	$ 225,000	$ 325,000
Collector M (Town Center)	Collector (Modified)	4	82	1,000	$ 225.00	$ 325.00	$ 225,000	$ 325,000
Collector N	Collector	4	64	1,894	$ 225.00	$ 325.00	$ 426,125	$ 615,514
Collector N (Town Center)	Collector (Modified)	4	82	1,000	$ 250.00	$ 325.00	$ 250,000	$ 325,000
Collector O	Collector	4	64	4,655	$ 225.00	$ 325.00	$ 1,047,375	$ 1,512,875
Collector P	Collector	4	64	3,038	$ 225.00	$ 325.00	$ 683,550	$ 987,350
Collector Q	Collector	4	64	20,143	$ 225.00	$ 325.00	$ 4,532,175	$ 6,546,475
Collector R	Collector	4	64	6,152	$ 225.00	$ 325.00	$ 1,384,200	$ 1,999,400
Collector S	Collector	4	64	6,433	$ 225.00	$ 325.00	$ 1,447,425	$ 2,090,725
Collector T	Collector	4	64	18,214	$ 225.00	$ 325.00	$ 4,098,067	$ 5,919,430

Loma Norte	Collector	4	64	2,689	$ 225.00	$ 325.00	$ 605,025	$ 873,925
Sean Haggerty (Town Center)	Collector (Modified)	4	82	3,055	$ 250.00	$ 325.00	$ 763,750	$ 992,875
			Sub-Total	**176,441**			**$ 39,927,018**	**$ 57,343,387**
Minor Arterial A	Minor Arterial	4	76	10,303	$ 325.00	$ 425.00	$ 3,348,469	$ 4,378,767
Minor Arterial B	Minor Arterial	4	76	4,285	$ 325.00	$ 425.00	$ 1,392,576	$ 1,821,061
Minor Arterial C	Minor Arterial	4	76	4,123	$ 325.00	$ 425.00	$ 1,339,956	$ 1,752,250
Minor Arterial D	Minor Arterial	4	76	9,359	$ 325.00	$ 425.00	$ 3,041,675	$ 3,977,575
Minor Arterial E	Minor Arterial	4	76	11,349	$ 325.00	$ 425.00	$ 3,688,425	$ 4,823,325
Minor Arterial Traffic Circles E	Minor Arterial	4	76	5,938	$ 325.00	$ 425.00	$ 1,929,850	$ 2,523,650
Minor Arterial Traffic Circles D	Minor Arterial	4	76	5,938	$ 325.00	$ 425.00	$ 1,929,850	$ 2,523,650
Minor Arterial F	Minor Arterial	4	76	8,375	$ 325.00	$ 425.00	$ 2,721,875	$ 3,559,375
Minor Arterial G	Minor Arterial	4	76	2,209	$ 325.00	$ 425.00	$ 717,925	$ 938,825
Minor Arterial H	Minor Arterial	4	76	1,283	$ 325.00	$ 425.00	$ 416,826	$ 545,080
Minor Arterial I	Minor Arterial	4	76	2,413	$ 325.00	$ 425.00	$ 784,225	$ 1,025,525
Minor Arterial J	Minor Arterial	4	76	2,250	$ 325.00	$ 425.00	$ 731,250	$ 956,250
Minor Arterial K	Minor Arterial	4	76	1,296	$ 325.00	$ 425.00	$ 421,200	$ 550,800
Minor Arterial L	Minor Arterial	4	76	5,050	$ 325.00	$ 425.00	$ 1,641,250	$ 2,146,250
Marcus Uribe	Minor Arterial	4	76	7,478	$ 325.00	$ 425.00	$ 2,430,350	$ 3,178,150
Sean Haggerty	Minor Arterial	4	76	2,029	$ 325.00	$ 425.00	$ 659,425	$ 862,325
			Sub-Total	**83,677**			**$ 27,195,126**	**$ 35,562,857**
Stan Roberts, Sr. Ave.	Major Arterial	6	110	15,575	$ 525.00	$ 650.00	$ 8,176,702	$ 10,123,536
Sean Haggerty	Major Arterial	6	110	9,393	$ 525.00	$ 650.00	$ 4,931,325	$ 6,105,450
			Sub-Total	**24,968**			**$ 8,176,702**	**$ 16,228,986**
McCombs	Super Arterial	8	146	21,991	$ 700.00	$ 900.00	$ 15,393,700	$ 19,791,900
MLK	Super Arterial	8	146	21,368	$ 700.00	$ 900.00	$ 14,957,600	$ 19,231,200
			Sub-Total	**43,359**			**$ 30,351,300**	**$ 39,023,100**
Total							**$ 105,650,145**	**$ 148,158,329**

UTILITY INFRASTRUCTURE *(information provided by EPWU staff and formatted for style by KHA)*

The El Paso Water Utilities – Public Service Board (EPWU-PSB) exists to serve the water resource needs of the population of the El Paso geographical area. Its strategic and operational impetus is on delivering quality water, wastewater, and other services as demanded and as deemed feasible. One purpose of this study is to determine the necessary facilities of water, wastewater, and reclaimed water systems required to provide service to the Proposed Northeast Master Plan Alternative E.

To size the required facilities it is necessary to project water, and reclaimed water demands and wastewater flows resulting from the potential development of the Northeast in accordance to the Proposed Master Plan Alternative E. The methodology used to determine the demands and flows are explained in detail below.

Infrastructure - Analysis

Conducting detail water, wastewater, and reclaimed water analysis for each plan was both cost prohibitive and time prohibitive; therefore, a detailed analysis was only conducted for the Proposed Master Plan Alternative E.

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WATER SYSTEM ANALYSIS

Existing Water Distribution System

The EPWU currently operates several wells strategically scattered throughout the study area. These wells pump water, via low pressure water lines, to the Northeast Supply Reservoir. The Northeast Booster Station withdraws water from the Northeast Supply Reservoir and pumps it directly in to the East High Pressure Zone's distribution system and supplies the War Highway/North Hill Supply Reservoir. The North Hill Booster Station, along with the War Road Pump Station conveys water to the War Road Reservoir (1.4 MG capacity). The reservoir is a distribution/equalization reservoir for the War Highway Pressure Zone. The North Hills Subdivision, located southwest of the study area, lies within the War Highway Pressure Zone. Two wells, #33 & #52 also pump into the War Highway Pressure Zone. Table 10.17 identifies some of the distribution waterlines that serve the North Hills Subdivision, as shown in Plate 30 (provided by EPWU).

No other water facilities exist within the Franklin East 1 Pressure Zone, except for a single 12-inch waterline that extends along McCombs Blvd. to the Painted Dunes Golf Course.

PLATE 30 NE MP EXISTING POTABLE WATER SYSTEM

TABLE 10.17: EXISTING WATER DISTRIBUTION SYSTEM - WAR HIGHWAY PZ

No.	STREET	FROM	TO	PIPE MATERIAL	SIZE In	Comments
1	Loma del Norte Dr.	War Road Reservoir	Northern Boundary Line	PVC	16/12	Along the western Boundary
2	Jon Cunningham Blvd.	Loma del Norte Drive	Eastern Boundary Line	PVC	12	Along the southern Boundary
3	Loma Franklin Drive	Jon Cunningham Blvd.	Northern Boundary Line	PVC	8	One block west of the eastern boundary
4	Loma Real Avenue	Martin Luther King Blvd.	Eastern Boundary Line	PVC	12	Connects to 8-inch on Loma Franklin Dr.
5	Southern Boundary Line	War Road/North Hills Pump Station	Martin Luther King Blvd	PVC	16	Connects to Well #52 supply line (16-inch)
6	Martin Luther King Blvd	Well #33	Southern Boundary Line.	AC/CI	12	Connects to Well #52 supply line (16-inch)

Projected Demands

Most of the land that is located within the study area is undeveloped. The Proposed Master Land Use Plan Alternative E indicates that approximately 13,000 acres could be developed. Approximately 8,145 acres are anticipated as residential development, 1,029 acres of potential commercial development, 298 acres are anticipated for schools, and 545 acres have been set aside for parks; see Plate 23. Approximately 1,573 acres are located within the Planned Mountain Development Zone (PMD); see Table 10.18 (this analysis provided by EPWU)

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TABLE 10.18: NORTHEAST MASTER PLAN - ACREAGE BY LAND USE

LAND USE	ACRES
Residential	8,145
Commercial	1,029
Office	1,373
Retail	515
Industrial	0
Public	18
Parks	545
Schools	298
PMD	1,573
Total	12,951

This study calculates the expected water demands associated with the anticipated development patterns of the subject property. It also recommends the facilities required to provide water service to the study area. Residential water demand rates used in this study were those recommended by *Parkhill, Smith, and Cooper* Engineers' Eastside Zaragoza Service Area Study, a.k.a. Tri-Loop Study, dated August 16, 2002. The demand rates for commercial, industrial, schools, etc. were developed in accordance with achieving a 140 gal/cap/day composite demand rate.

The following discussion explains the development of the average and peak day demands used to size the water facilities required for the Phase I (first 30 Years Growth) and the Phase II-Build Out scenarios. Phase 1 development will encompass approximately 5,809 acres. Table 10.19 summarizes Phase 1 acreage per land use.

Phase I - 30 Year Growth

Average water demand associated with the anticipated residential development (low, medium, and high density) was calculated by applying a 115-gal/cap/day unit demand rate. A population density factor of 3.5 people per dwelling was applied for residential development. A 3.5 dwellings per acre rate was applied to low density development, 6 dwellings per acre for moderate density and 15 dwelling per acre for high density. This study utilized a 1.71 peak factor to determine peak day demand, as recommended in *Parkhill, Smith, and Cooper* Engineers' Distribution System Modeling Study, dated May 2004. The peak day demand rate calculates to 196.65 gal/cap/day. The total peak day water demand rate due to residential development (3,258 acres) equaled approximately 16.5 MGD (11,452 gpm).

Commercial water demand was calculated by using 1,116 gal/day/acre. A 1.71 peak factor was used to calculate the peak day demand for 1,129 acres of commercial development, including retail, and office. This calculated to approximately 2.22 MGD (1,544 gpm) demand.

The commercial water demand of 1,116 gal/day/acre was also applied to parks, public, and schools (459 acres-combined) in this study. The combined peak water demand (using a 1.71 peak factor) was calculated at approximately 0.24 MGD (167 gpm).

The total expected water demand by the study area for Phase I is approximately 18.95 MGD (13,162 gpm). Table 10.20 presents average and peak day demand per district according to EPWU staff. The existing system is not capable of serving the total peak day demand. Improvements to the water system are necessary to provide water service. The calculated average and peak day composite demand for Phase 1 of the study area are 132 gal/cap/day, and 226 gal/day/cap, respectively. Plate 31 illustrates diagrammatically the proposed water improvements. (provided by EPWU)

TABLE 10.19: 30-YEAR GROWTH PHASE 1 - ACREAGE BY LAND USE

LAND USE	ACRES
Residential	3,258
Commercial	378
Office	506
Retail	245
Industrial	0
Public	7
Parks	338
Schools	114
Natural Transition Buffer	963
Total	5,809

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TABLE 10.20: PROJECTED WATER DEMANDS – PHASE 1

DISTRICT	Average Daily Demand (gpm)	Peak Daily Demand (gpm)
2	1,208	2,065
3	1,805	3,087
4	477	815
5	2,294	3,923
6	1,914	3,273
TOTAL	**7,698**	**13,163**

Plate 31 NEMP Water System Phase I

Phase II - Build-Out

The unit rates used to calculate Phase 1 demands were also used to calculate Phase II demands. The peak day demand rate calculated to 239.40 gal/cap/day. The total peak day water demand rate due to anticipated residential development (8,389 acres) was approximately 39.7 MGD (27,587 gpm). The total peak day water demand rate due to anticipated commercial development (8,389 acres), including retail, and office was approximately 5.86 MGD (4,069 gpm).

The commercial water demand of 1,116 gal/day/acre was also applied to parks, public, and schools (1,123 acres) in this study. The combined peak water demand (using a 1.71 peak factor) was calculated at approximately 0.63 MGD (440 gpm). The commercial water demand of 1,116 gal/day/acre was also applied to industrial parcels (1,152 acres-combined) in this study. The combined peak water demand (using a 1.71 peak factor) was calculated at approximately 2.1 MGD (1,488 gpm).

The total expected water demand by study area was approximately 48.36 MGD (33,585 gpm), see Table 10.18. Table 10.21 presents average and peak day demand per district as per EPWU analysis. The existing system is not capable of serving the total peak day demand. Improvements to the water system are necessary to provide water service.

The calculated average composite demand for the study area was 140 gal/cap/day.

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TABLE 10.21: PROJECTED WATER DEMANDS – BUILD OUT

DISTRICT	Average Daily Demand (gpm)	Peak Daily Demand (gpm)
1	1,830	3,129
2	1,208	2,065
3	3,695	6,318
3-A	885	1,512
4	477	815
5	2,295	3,923
6	1,915	3,273
7	6,673	11,412
Industrial	665	1,138
PMD	0	0
TOTAL	**19,643**	**33,585**

The combined total peak day demand was calculated to be 48.36 MGD. A hydraulic analysis of the proposed water system using H2ONET water modeling software was used to determine the required pipe sizes. A non-simultaneous fire flow demand of 1,500 gpm was applied to each node within the model.

Service Elevations/Pressure Zones

The El Paso Water Utilities' 1994 Water Facilities Master Plan indicates that the study area would be served by the extension of the War Highway Pressure Zone. During the analysis it was determined that the previously recommended system was not feasible. An intermediate pressure zone that would encompass a large amount of land with large demands would be necessary. This requires installing numerous pressure reducing valves on large transmission mains.

Instead, two new pressure zones will be created, Franklin East 1 PZ, and Franklin East 2 PZ. The area located lower than elevation 4,100 feet to US-54 will lay within the Franklin East 1 Pressure Zone. The area located from elevation 4,300 feet (more or less the Planned Mountain Development boundary) to elevation 4,100 feet will lay within the

Franklin East 2 Pressure Zone. The creation of an intermediate pressure zone from elevation 4,200 ft to 4,100 ft will be necessary.

Water System Recommendations

This section describes the proposed water facilities improvements needed beginning at Year 0 (immediately after first land sale), Year 10, Year 20, Year 30, Year 35, Year 40, and Year 50 to build-out.

Phase I - 30 Year Growth

Franklin East 1 Pressure Zone

The construction of the North 2 Reservoir (5 MG); which is scheduled for Year 2006, will serve as a distribution/equalization storage reservoir for the East High Pressure Zone and as supply for the North 2 Booster Station. The North 2 Reservoir and the North 2 Booster Station will be constructed north of the existing North Hills Subdivision along Martin Luther King Blvd. The booster station will supply approximately 22 MGD to meet the 30 year (Phase I) growth demand. The booster station will pump into the Franklin East 1 Reservoirs #1 & #2 (#1 with a 4 MG capacity, and #2 with a 5 MG capacity) via 42-inch, 36-inch, 24-inch, and 16-inch waterlines.

The construction of the Franklin East 1 Reservoirs #1 & #2 and the North 2 Booster Station have not been included in the EPWU-PSB 10-Year Capital Improvement Program; but a preliminary phasing plan that was developed by EPWU suggests that the improvements can be constructed in 10-year intervals. Such as the diagrammatic illustration of the proposed facilities as indicated on Plate 31 (provided by EPWU).

TABLE 10.22: YEAR 0, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	North 2 Reservoir #1,		5 MG	Overflow Elev. 4138 ft
2	North 2 Booster Station,		5 MGD firm	
3	Franklin East 1 Reservoir #1,		4 MG	Overflow Elev. 4228 ft
4	Furnish & Install 42-inch SCCP	3,900		
5	Furnish & Install 36-inch SCCP	2,500		
6	Furnish & Install 16-inch PVC	7,500		

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TABLE 10.23: YEAR 10, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	North 2 Reservoir #2,		5 MG	Overflow Elev. 4138 ft
2	North 2 Booster Station,		5 MGD firm	Add Pumping Capacity

TABLE 10.24: YEAR 20, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	East High PZ Elevated Storage Res,		2.5 MG	Overflow Elev. 4138 ft
2	North 2 Booster Station,		12 MGD firm	Add Capacity
3	Franklin East 1 Reservoir #2,		5 MG	Overflow Elev. 4228 ft
4	Furnish & Install 24-inch SCCP	19,400		
5	Furnish & Install 16-inch PVC	19,100		

Franklin East 2 Pressure Zone

District 2 of the study area is completely located within the proposed Franklin East 2 Pressure Zone. This area is located west and northwest of the existing North Hills Subdivision. It is the projection of this report that the development of District 2 will begin in Year 10. At this time the construction of a Franklin East 1 Booster Station #1 at the Franklin East 1 Reservoirs #1 & #2 site; which will be constructed in Year 10, and a new reservoir (Franklin East 2 Reservoir #1) with an overflow elevation of 4404 ft will be necessary. A waterline to connect the Franklin East 1 Booster Station #1 to Franklin East 2 Reservoir #1 will also be required. The booster station will have a firm pumping capacity of 5 MGD. Franklin East 2 Reservoir #1 will have a 3 MG storage capacity and will be located within the PMD zone near the state park boundary line. This reservoir will serve development located between elevations 4300 ft to 4100 ft. An intermediate pressure zone will be created between elevations 4200 ft to 4100 ft. Several pressure reducing valves will be required along contour elevation 4200 ft.

The construction of the Franklin East 1 Booster Station #1 and the Franklin East 2 Reservoir #1 have not been included in the EPWU-PSB 10-Year Capital Improvement Program; but a preliminary phasing plan that was developed by EPWU suggests that the improvements can be constructed in 10-year intervals. Such as:

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TABLE 10.25 YEAR 10, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 2

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Franklin East 2 Reservoir #1,		3 MG	Overflow Elev. 4404 ft.
2	Franklin East 1 Booster Station #1,		5 MGD	
3	Furnish & Install 24-inch SCCP	7,300		
4	Furnish & Install 16-inch PVC	10,000		

No improvements are necessary to serve the Franklin East 2 Pressure Zone in Years 0 or 20**.**

Phase II – Build - Out

Phase II of the development includes the remaining portion of the study area, basically the northern half. The development of this area is projected to start after Phase I, 30 years and reach built out in 60 years; or 30 years after Phase I is completely developed. It is assumed that the water facilities mentioned in the previous paragraphs have been constructed and are fully operational.

Franklin East 1 Pressure Zone

Most of study area's Phase II is located within the proposed Franklin East 1 Pressure Zone.

Additional pumping capacity (12 MGD) will be required at the North 2 Booster Station and additional storage capacity (14 MG) will also be required to serve the Franklin East 1 Pressure Zone. Table 10.24 shows that a 2.5 MG elevated water storage reservoir (Elevated Storage Reservoir #1) that will serve the East High Pressure Zone will be constructed in Year 20. Another 2.5 MG elevated water storage reservoir for the East High Pressure Zone will be required by Year 35. A preliminary location for the second elevated reservoir is the intersection of the proposed Northeast Parkway and US 54. A booster station (Booster Station #2) at the second elevated storage reservoir with an ultimate firm pumping capacity of 20 MGD to meet built out demand will pump water into the Franklin East Pressure Zone. A series of 36-inch, 24-inch, and 16-inch waterlines will be required to transport the water from the East High Reservoir to the Franklin East 1 Reservoirs.

Water distribution mains (8-inch and 12-inch) must be constructed to distribute water through out the study area by the developer(s).

The following tables show the required improvements for the Franklin East 1 Pressure Zone for Year 30 to Built Out, as illustrated in the diagrammatic description illustrated on Plate 32 (provided by the EPWU).

Plate 32 NEMP Water System Phase II

TABLE 10.26: YEAR 30, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	North 2 Booster Station,		4 MGD firm	Add Capacity
2	Franklin East 1 Reservoir #3,		4 MG	OverFlow Elev. 4228 ft.
3	Furnish & Install 24-inch SCCP	15,000		
4	Furnish & Install 16-inch PVC	10,000		

TABLE 10.27: YEAR 35, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	East High PZ Elevated Storage Res,		2.5 MG	OverFlow Elev. 4138 ft.
2	East High Booster Station,		12 MGD firm	
3	Franklin East 1 Reservoir #4,		5 MG	OverFlow Elev. 4228 ft.
4	Furnish & Install 36-inch SCCP	7,300		
5	Furnish & Install 24-inch SCCP	55,500		
6	Furnish & Install 16-inch PVC	16,000		

TABLE 10.28: YEAR 40, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	North 2 Booster Station,		8 MGD	Add Capacity
2	Franklin East 1 Reservoir #5,		5 MG	

Franklin East 2 Pressure Zone

District 1 of the study area is completely located within the proposed Franklin East 2 Pressure Zone. This area encompasses approximately 1,478 acres of the Master Plan's most northwestern corner. It is the projection of this report that the development of District 1 will begin in Year 50. At this time the construction of Franklin East 1 Booster Station #2 at the Franklin East 1 Reservoirs #4 & #5 site and a new reservoir (Franklin East 2 Reservoir #2) with an overflow elevation of 4404 ft will be necessary. A waterline to connect the Franklin East 1 Booster Station #2 to Franklin East 2 Reservoir #2 will also be required. Franklin East 1 Booster Station #2 will have a firm pumping capacity of 6 MGD. Franklin East 2 Reservoir #2 will have a 3 MG storage capacity and will be located within the PMD zone near the state park boundary line. This reservoir will serve development located between elevations 4,300 ft to 4,100 ft; through a couple of pressure reducing valves to serve below elevation 4,200 ft, see Plate 32 (provided by the EPWU).

TABLE 10.29: YEAR 50, RECOMMENDED WATER IMPROVEMENTS FRANKLIN EAST 2

No.	Improvement Description	Length (ft)	Capacity	Comments
	East High Booster Station,		8 MGD	Add Capacity
	Franklin East 1 Booster Station #2,		6 MGD	
	Franklin East 2 Reservoir #2,		3 MG	OverFlow Elev. 4404 ft.
	Furnish & Install 16-inch PVC	5,700		

COST ANALYSIS OF WATER SYSTEM IMPROVEMENTS

To distribute the projected water demand several water system improvements must be constructed. Estimated construction costs associated to the preliminary phasing plan that was developed by EPWU based on 10-year intervals are presented in the following Tables 10.30 through 10.36.

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TABLE 10.30: YEAR 0, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 PZ-PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	North 2 Reservoir #1, 5 MG	LS	1	$5,000,000	$5,000,000
2	North 2 Booster Station, 5 MGD firm	LS	1	$480,000	$480,000
3	Franklin East 1 Reservoir #1, 4 MG	LS	1	$4,000,000	$4,000,000
4	Furnish & Install 42-inch SCCP	LF	3,900	$150	$585,000
5	Furnish & Install 36-inch SCCP	LF	2,500	$125	$312,500
6	Furnish & Install 16-inch PVC	LF	7,500	$60	$450,000
7	Trench Excavation Protection	LF	13,900	$3	$41,700
8	Electrical	LS	1	$145,000	$145,000
9	Telemetry	LS	1	$50,000	$50,000
10	Chlorination	LS	1	$75,000	$75,000
11	Sub-Total				**$11,139,200**
12	Mobilization	%	5		$556,960
13	Contingencies	%	15		$1,670,880
14	Engineering	%	15		**$**1,670,880
15	Total Estimated Construction Cost				**$15,037,920**

TABLE 10.31: YEAR 10, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 & 2 PZ-PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	North 2 Reservoir #2, 5 MG	LS	1	$5,000,000	$5,000,000
2	North 2 Booster Station, add 5 MGD firm	LS	1	$480,000	$480,000
3	Franklin East 1 Booster Station #1, 5 MGD	LS	1	$480,000	$480,000
4	Franklin East 2 Reservoir #1, 3 MG	LS	1	$3,000,000	$3,000,000
5	Furnish & Install 24-inch SCCP	LF	7,300	$90	$657,000
6	Furnish & Install 16-inch PVC	LF	10,000	$60	$600,000
7	Trench Excavation Protection	LF	17,300	$3	$51,900
8	Electrical	LS	1	$245,000	$245,000
9	Telemetry	LS	1	$50,000	$50,000
10	Chlorination	LS	1	$75,000	$75,000
11	Sub-Total				**$10,638,900**
12	Mobilization	%	5		$531,945
13	Contingencies	%	15		$1,595,835
14	Engineering	%	15		**$**1,595,835
15	Total Estimated Construction Cost				**$14,362,515**

TABLE 10.32 YEAR 20, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 PZ-PHASE1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	East High PZ Elevated Storage Res, 2.5 MG	LS	1	$2,500,000	$2,500,000
2	North 2 Booster Station, add 12 MGD firm	LS	1	$1,152,000	$1,152,000
3	Franklin East 1 Reservoir #2, 5 MG	LS	1	$5,000,000	$5,000,000
4	Furnish & Install 24-inch SCCP	LF	19,400	$90	$1,746,000
5	Furnish & Install 16-inch PVC	LF	19,100	$60	$1,146,000
6	Trench Excavation Protection	LF	38,500	$3	$115,500
7	Electrical	LS	1	$400,000	$400,000
8	Telemetry	LS	1	$100,000	$100,000
9	Chlorination	LS	1	$125,000	$125,000
10	Sub-Total				**$12,284,500**
11	Mobilization	%	5		$614,225
12	Contingencies	%	15		$1,842,675
13	Engineering	%	15		**$**1,842,675
14	Total Estimated Construction Cost				**$16,584,075**

TABLE 10.33: YEAR 30, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	North 2 Booster Station, add 4 MGD firm	LS	1	$384,000	$384,000
2	Franklin East 1 Reservoir #3, 4 MG	LS	1	$4,000,000	$4,000,000
3	Furnish & Install 24-inch SCCP	LF	15,000	$90	$1,350,000
4	Furnish & Install 16-inch PVC	LF	10,000	$60	$600,000
5	Trench Excavation Protection	LF	25,000	$3	$75,000
6	Electrical	LS	1	$125,000	$125,000
7	Telemetry	LS	1	$50,000	$50,000
8	Chlorination	LS	1	$75,000	$75,000
9	Sub-Total				**$6,659,000**
10	Mobilization	%	5		$332,950
11	Contingencies	%	15		$998,850
12	Engineering	%	15		**$**998,850
13	Total Estimated Construction Cost				$**8,989,650**

TABLE 10.34: YEAR 35, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	East High PZ Elevated Storage Res, 2.5 MG	LS	1	$2,500,000	$2,500,000
2	East High Booster Station, 12 MGD firm	LS	1	$1,152,000	$1,152,000
3	Franklin East 1 Reservoir #4, 5 MG	LS	1	$5,000,000	$5,000,000
4	60-inch Steel Casing, Jack and Bore	LF	500	$700	$350,000
5	Furnish & Install 36-inch SCCP	LF	7,300	$125	$912,500
6	Furnish & Install 24-inch SCCP	LF	55,500	$90	$4,995,000
7	Furnish & Install 16-inch PVC	LF	16,000	$60	$960,000
8	Trench Excavation Protection	LF	78,800	$3	$236,400
9	Traffic Control	LS	1	$20,000	$20,000
10	Electrical	LS	1	$300,000	$300,000
11	Telemetry	LS	1	$75,000	$75,000
12	Chlorination	LS	1	$100,000	$100,000
13	Sub-Total				**$16,600,900**
14	Mobilization	%	5		$830,045
15	Contingencies	%	15		$2,490,135
16	Engineering	%	15		**$**2,490,135
17	Total Estimated Construction Cost				**$22,411,215**

TABLE 10.35: YEAR 40, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	North 2 Booster Station, add 8 MGD	LS	1	$768,000	$768,000
2	Franklin East 1 Reservoir #5, 5 MG	LS	1	$5,000,000	$5,000,000
3	Electrical	LS	1	$250,000	$250,000
4	Telemetry	LS	1	$75,000	$75,000
5	Chlorination	LS	1	$100,000	$100,000
6	Sub-Total				**$6,193,000**
7	Mobilization	%	5		$309,650
8	Contingencies	%	15		$928,950
9	Engineering	%	15		$928,950
10	Total Estimated Construction Cost				**$8,081,865**

TABLE 10.36: YEAR 50, CONSTRUCTION COST ESTIMATE-WATER FRANKLIN EAST 1 & 2 PZ-PHASE 2

No.	Descrip6ion	Unit	Quantity	Cost/Unit	Total
1	East High Booster Station, add 8 MGD	LS	1	$770,000	$770,000
2	Franklin East 1 Booster Station #2, 6 MGD	LS	1	$555,000	$555,000
3	Franklin East 2 Reservoir #2, 3 MG	LS	1	$3,000,000	$3,000,000
7	Furnish & Install 16-inch PVC	LF	5,700	$60	$342,000
8	Trench Excavation Protection	LF	5,700	$3	$17,100
10	Electrical	LS	1	$450,000	$450,000
11	Telemetry	LS	1	$100,000	$100,000
12	Chlorination	LS	1	$125,000	$125,000
13	Sub-Total				**$5,359,100**
14	Mobilization	%	5		$267,955
15	Contingencies	%	15		$803,865
16	Engineering	%	15		**$**803,865
17	Total Estimated Construction Cost				**$7,234,785**

Phase 1, Franklin East 1 $ 2 Pressure Zones – Total Estimated Construction Cost $45,984,510

Approximate Cost: $46,000,000

Phase 2, Franklin East 1 $ 2 Pressure Zones – Total Estimated Construction Cost $46,717,515

Approximate Cost: $47,000,000

Grand Total Water Systems Construction Cost for Built-Out of the Northeast Master Plan

Approximate Cost: $93,000,000

WASTEWATER SYSTEM ANALYSIS

Existing Wastewater Collection System

There is no existing wastewater service in the area; however, the El Paso Water Utilities-Public Service Board currently provides wastewater collection service to the area located outside and south of the study area, mainly the North Hills Subdivision. The wastewater service is provided via the following facilities.

The North Hills Subdivision's wastewater is collected by a 15-inch interceptor and a 12-inch collector. The wastewater is conveyed into a 15-inch interceptor that is located on McCombs Blvd. and is eventually discharged into the Grouse Lift Station.

The North Hills Subdivision is divided along Martin Luther King Blvd. into two tributary areas. The west tributary area is served by a 12-inch collector that extends in a north/south direction along Martin Luther King Blvd. from Marcus Uribe Drive to US-54. Along its path the 12-inch collector main connects to several 8-inch wastewater mains that discharge into the 12-inch wastewater main.

The eastern half of the North Hills Subdivision is served by a 15-inch interceptor that extends in a north/south direction along an easement adjacent to an El Paso Electric Company easement.

A 12-inch collector that begins at Loma Del Rey Drive and extends south along Loma De Color Drive (approx. 2,300 ft) to Loma Grande Drive, collects wastewater from several 8-inch mains. At the intersection of Loma Grande Drive and Loma De Color the collector enlarges to a 15-inch interceptor and continues south for approximately 1,200 ft, along an easement that is located adjacent to the El Paso Electric Company easement to a 200 ft drainage easement. An 8-inch wastewater main connects to the interceptor at Jon Cunningham Drive. The drainage easement extends in a northeasterly direction, adjacent and parallel to the Patriot Freeway (US54).

The 12-inch collector and the 15-inch interceptor cross US-54 at Martin Luther King Blvd. and Sean Haggerty Avenue, respectively. Following different routes the two wastewater mains meet at the Rushing/Sweetwater intersection. A 12-inch wastewater main on Sweetwater Drive conveys the wastewater to the 15-inch interceptor on McCombs.

The 15-inch interceptor extends south to Dyer. The main continues south along Dyer to Fairbanks Avenue. The wastewater is transferred to a 21-inch interceptor at the Fairbanks/Dyer intersection. The 21-inch wastewater main continues south along Dyer to Woodrow Bean Trans Mountain Drive. The interceptor follows Trans Mountain Drive east to McCombs, approximately 750 ft. The interceptor turns north along McCombs to

Pheasant Street. The 21-inch wastewater interceptor continues north to Deer Street. At this intersection (Pheasant Street and Deer Street) the interceptor splits into two (2) 21-inch interceptors. One main continues north along Pheasant to Sun Valley Drive. The other wastewater line extends east along Deer to Railroad Drive.

The interceptor that is located on Pheasant Street and continues north to Sun Valley enlarges to a 24-inch interceptor at the Pheasant/Sun Valley intersection. This main extends in an easterly direction for approximately 900 ft. At this point the interceptor makes a left turn (north) through undeveloped land, through a 50' El Paso Electric easement to a 50' drainage easement. The interceptor enlarges to 30-inch, makes a right turn (east) and extends along the drainage easement to the Grouse Lift Station.

As mentioned in the above paragraphs, the 21-inch interceptor that extends along Pheasant Street from McCombs to Deer Street splits into two (2) 21-inch interceptors. One interceptor continues north along Pheasant Street to Sun Valley Drive and the other extends in an easterly direction along Deer Street.

The 21-inch interceptor that extends along Deer Street connects to another 21-inch interceptor within the Southern Pacific Railroad right of way; adjacent to the eastern El Paso City Limits. The two 21-inch interceptors discharge into a 24-inch interceptor that discharges into the Grouse Lift Station. The Grouse Lift Station's firm pumping capacity is 27 MGD. Currently only 17 MGD is conveyed by the lift station to the treatment plant. Therefore, the lift station has excess capacity. Plate 33 is a diagrammatic description of the existing system (provided by the EPWU).

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Plate 33 NEMP Existing Wastewater System

TABLE 10.37: EXISTING WASTEWATER SYSTEM

No.	STREET	FROM	TO	FACILITY	LENGTH ft	SIZE in	CAPACITY gpm
1	Martin Luther King Blvd.	Marcus Uribe Drive	Patriot Freeway	Gravity Main	2,000	12	750
2	Loma De Color Drive	Loma Del Rey Drive	Loma Grande Drive	Gravity Main	2,300	12	1,228
3	Easement, adjacent to EPEC easement	Loma Grande Drive	200 ft drainage easement	Gravity Main	1,200	15	1,164
4	200 ft drainage easement	EPEC easement	Sean Haggerty Blvd.	Gravity Main	3,100	15	3,504
5	Sweetwater Drive	Rushing Blvd.	McCombs Blvd.	Gravity Main	3,750	12	1,134
6	McCombs Blvd.	Sweetwater Drive	Dyer Street	Gravity Main	8,900	15	1,107
7	Dyer Street	McCombs Blvd.	Fairbanks Avenue	Gravity Main	700	15	1,534
8	Dyer Street	Fairbanks Avenue	Trans Mountain Dr.	Gravity Main	450	21	3,900
9	Trans Mountain Drive	Dyer Street	McCombs Blvd.	Gravity Main	750	21	3,410
10	McCombs Blvd.	Trans Mountain Drive	Pheasant Street	Gravity Main	270	21	3,410
11	Pheasant Street	McCombs Blvd.	Deer Street	Gravity Main	2,800	21	2,430
12	Pheasant Street	Deer Street	Sun Valley Drive	Gravity Main	1,500	21	2,845
13	Sun Valley Drive	Pheasant Street	900 ft east of Pheasant Street	Gravity Main	900	24	3,211
14	Easement	Sun Valley Drive	100 ft drainage/EPE Easement	Gravity Main	1,450	24	3,211
15	100 ft drainage/EPE Easement	Easement	Grouse Lift Station	Gravity Main	5,700	30	5,821

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TABLE 10.38: EXISTING WASTEWATER SYSTEM

No.	STREET	FROM	TO	FACILITY	LENGTH ft	SIZE in	CAPACITY gpm
1	Deer Street	Pheasant Street	Southern Pacific Railroad ROW	Gravity Main	5,750	21	2,268
2	Southern Pacific Railroad ROW	Deer Street	150 ft northeast of Deer Street	Gravity Main	150	21	2,268
3	Southern Pacific Railroad ROW	150 ft northeast of Deer Street	Grouse Lift Station	Gravity Main	2,800	24	3,240

TABLE 10.39: EXISTING WASTEWATER SYSTEM

No.	STREET	FROM	TO	FACILITY	LENGTH ft	SIZE in	CAPACITY gpm
1	Southern Pacific Railroad ROW	Grouse Lift Station	Southern Pacific Railroad ROW	Gravity Main	5,750	21	2,268
2	Southern Pacific Railroad ROW	Deer Street	150 ft northeast of Deer Street	Gravity Main	150	21	2,268
3	Southern Pacific Railroad ROW	150 ft northeast of Deer Street	Grouse Lift Station	Gravity Main	2,800	24	3,240

Projected Flows

This study predicts the expected wastewater produced by the study area except the land located within the PMD zone; no development is assumed to occur in the PMD zone. It also recommends the facilities required to provide wastewater collection service to the study area. El Paso Water Utilities' standard average flow rates were used to determine wastewater flow associated to residential, commercial, and industrial development. EPWU standard flow rates are as follows: residential 70 gal/cap/day, commercial 2,155 gal/ac/day, and industrial 840 gal/ac/day.

The following paragraphs explain the development of the average and peak day wastewater flows used to size the wastewater facilities that are required for the Phase I (first 30 Years Growth) and the Phase II-Built Out scenarios. Phase 1 development will encompass approximately 5,809 acres. Table 10.19 summarizes Phase 1 acreage per land use.

The wastewater collected from the study area is expected to be treated at the Fred Hervey Water Reclamation Plant. This plant has the capability of treating an additional 10 MGD of wastewater.

Phase I - 30 Year Growth

The average wastewater flow associated to residential development (low, medium, and high density) was calculated by applying a 70 gal/cap/day unit flow rate as indicated in the El Paso Water Utilities (EPWU) Design Standards. Approximately 3,191 acres is designated as residential development in Phase I of the Northeast Master Land Use Plan. A population density factor of 3.5 people per dwelling is applied for all residential development. A 3.5 dwellings per acre rate is applied to low density development, 6 dwellings per acre for moderate density and 15 dwellings per acre for high density. This study uses a 1.73 peak factor to determine peak day flow for all residential development. The peak factor was calculated using the $PF = 5/(P^{0.2})$ formula; where P = Population in thousands, as found in EPWU's design standards. The peak factor was calculated by considering the entire area's projected population as a whole.

The total peak day wastewater flow rate due to residential development (3,258) acres equates to approximately 10.15 MGD (7,052 pm).Commercial, including retail, public, office, and schools wastewater flow were calculated by using 2,155 gal/day/acre as recommended in the EPWU's Design Standards. This study uses a 2.46 peak factor to determine peak day wastewater flows. The peak factor was also calculated based on EPWU design standards. Total wastewater flows associated to 1,292 acres of commercial development equals to approximately 6.85 MGD (4,756 gpm).

Phase I of the Northeast Master Plan does not expect any industrial development.

The total expected wastewater flow for Phase I is approximately 17.0 MGD (11,807 gpm), Table 10.40 presents average and peak day flows per district. The existing system is not capable of serving the total peak day flow. Improvements to the wastewater system are necessary to provide wastewater collection and treatment service.

The calculated average composite wastewater flow for the study area is 202.76 gal/cap/day.

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TABLE 10.40: PROJECTED WASTEWATER FLOWS – PHASE I

DISTRICT	Average Daily Demand (gpm)	Peak Daily Demand (gpm)
2	847	1,586
3	1,330	2,548
4	921	2,266
5	1,709	3,290
6	1,202	2,118
TOTAL	**6,009**	**11,808**

Phase II - Built-Out

The unit rates used to calculate Phase I flows were used to calculate Phase II flows.

The total peak day wastewater flow rate due to residential development equates to approximately 24.46 MGD (16,983 pm).

Commercial, including retail, public, office, and schools wastewater flow were calculated by using 2,155 gal/day/acre as recommended in the EPWU Design Standards. This study uses a 2.46 peak factor to determine peak day wastewater flows. The peak factor was also calculated based on EPWU design standards. Total wastewater flows associated to 4,223 acres of commercial development equals to approximately 18.02 MGD (12,515 gpm).

Industrial development wastewater flow was calculated by using 840 gal/day/acre as recommended in the EPWU Design Standards. This study uses a 2.46 peak factor to determine peak day wastewater flows. The peak factor was also calculated based on EPWU design standards. Total wastewater flows associated to 1,123 acres of industrial development equals to approximately 2.32 MGD (1,610 gpm).

The total expected wastewater flow by the study area is approximately 44.82 MGD (31,108 gpm). Table 10.41 presents average and peak day flows per district. The existing system is not capable of serving the total peak day flow. Improvements to the wastewater system are necessary to provide wastewater collection and treatment service.

The calculated average composite wastewater flow for the study area is 221.74 gal/cap/day.

TABLE 10.41: PROJECTED WASTEWATER FLOWS – BUILT OUT

DISTRICT	Average Daily Demand (gpm)	Peak Daily Demand (gpm)
1	1,199	2,164
2	847	1,585
3	2,563	4,787
3-A	1,586	3,898
4	921	2,263
5	1,709	3,288
6	1,202	2,117
7	4,871	9,358
Industrial	671	1,648
PMD	0	0
TOTAL	**15,570**	**31,108**

Wastewater System Recommendations

In sizing the interceptors, lift stations and force mains to serve the study area through build-out, the peak flows for each segment of each line were computed on the land uses, populations, and flow factors developed above. Once peak flows were established for each sewer segment, the size and slope of the segment was determined in accordance with EPWU design standards.

Typically, sizing of the wastewater interceptor facilities to serve a study area is dependant on all factors mentioned in the previous paragraph as well as serving the anticipated ultimate development of the geographic drainage basins in the study area. This section describes the proposed wastewater facilities improvements needed beginning at Year 0 (immediately after first land sale), Year 10, Year 20, Year 30, Year 35, Year 40, and Year 50 to build-out. As previously stated, the Grouse Lift Station has excess capacity. This report recommends maximizing the lift station before other lift stations are constructed. Also this report uses the same nomenclature and watershed identification as used by CSA's Northeast El Paso Wastewater Facility Master Plan, 1994.

Phase I - 30 Year Growth
Interceptor System IV

Interceptor system IV consists of two interceptors, Interceptor IVA, and IVB that convey wastewater produced by the study area to either the Grouse Lift Station or to a proposed new lift station.

Interceptor IVA

Interceptor IVA extends northwest from the Grouse Lift Station to the study area. The interceptor consists of 4,500 ft of 30-inch, 10,750 ft of 27-inch, 16,290 ft of 24-inch, and 3,350 ft of 18-inch diameter sewer interceptor. The wastewater interceptor follows and alignment generally described by the following:

a. In a northerly direction, as a 30-inch diameter through undeveloped land located within Section 32, Block 80, TSP 1 to Tiger Eye Street.
b. Westerly along Tiger Eye across Dyer Street, as a 27-inch diameter.
c. Northwesterly as a 27-inch diameter pipeline through the Greenbelt Levee to Sean Haggerty Blvd.
d. Westerly along Sean Haggerty, as a 27-inch diameter pipeline to McCombs Blvd.
e. Northerly along McCombs Blvd. as a 24-inch to Colin Powel Avenue.
f. Westerly along Colin Powell Ave. as a 24-inch to and across US-54.
g. In a northerly direction as a 27-inch diameter pipeline through the study area for approximately 9,300 ft.
h. Northerly through the study area as an 18-inch diameter pipeline for approximately 3,350 ft.

The existing Grouse Lift Station currently has a design capacity of 27 MGD. The station is currently pumping approximately 17 MGD. After review of the development trends within the Northeast El Paso area, it appears that the 10 MGD excess capacity at the Grouse Lift Station is capable of handling the wastewater flows generated from the anticipated development within the western part of the study area through 10-15 years after start of development, or beyond. A 21-inch force diameter force main will be needed to meet the projected flows. The wastewater flow was calculated based on the criteria and assumptions discussed and mentioned in the previous sections of this report. In Year 10, Interceptor IVA will carry an average flow of 1,040 gpm (1.5 MGD) with a maximum day flow of 1,882 gpm (2.7 MGD). By Year 30, Interceptor IVA will carry an average flow of 3,403 gpm (4.9 MGD) with a maximum day flow of 6,725 gpm (9.6 MGD).

Interceptor IVB

Interceptor IVB extends northwest from a new Lift Station to the study area. The interceptor consists of 8,400 ft of 30-inch, 1,000 ft of 24-inch, and 3,750 ft of 18-inch, diameter sewer interceptor. The wastewater interceptor follows an alignment generally described by the following:

a. New 7.7 MGD Lift Station will be constructed near Dyer Street, north of Sean Haggerty Drive .
b. A New 18-inch diameter force main, approx. 13,000 ft will convey the wastewater from the new lift station to the Fred Hervey Water Reclamation Plant .
c. A 30-inch pipeline will extend in a northwesterly direction toward US-54 for approximately 8,400 ft.
d. A 30-inch pipeline will cross under US-54.
e. Starting north of US-54 a 24-inch pipeline will extend in a northerly direction for approximately 1,000 ft.
f. The 24-inch pipeline will connect to an 18-inch pipeline that will extend in a northwesterly direction for approximately 3,750 ft.

Interceptor System III

Interceptor III will discharge into Interceptor IVB at the intersection of US-54 and McCombs Blvd. The interceptor will consist of 33-inch, 30-inch, and 21-inch diameter pipelines. This interceptor is generally described as follows:

a. Starting at a connection point to Interceptor IVB near the intersection of US-54 and McCombs Blvd as a 33-inch diameter pipeline, in a northeasterly direction for approximately 8,000 ft.
b. Continuing as a 33-inch diameter pipeline in a northwesterly direction, through the Painted Dunes Golf Course for approximately 4,500 ft.
c. In a northwesterly direction as a 30-inch diameter pipeline for approximately 4,200 ft.
d. Continuing in a northwesterly direction as a 21-inch diameter pipeline, approximately6,400 ft to connect to Interceptor IV.

The southern half of the study area is predicted by this study to develop within the first 30-years. The projected population for Phase 1-30 Year Growth is 83,855. Therefore, the wastewater infrastructure necessary to serve the study area for the planning period should be of similar intensity. However, the infrastructure proposed in this study is based on the build-out population of the study area which ultimately may be 200,000. The reason for proposing the infrastructure at build-out levels is simply because the facilities must be extended as development occurs, and it will be prohibitively expensive in the future to reconstruct the lines and lift stations for additional capacity after the study area develops. (Plate 34 provided by the EPWU).

Plate 34 NEMP Wastewater System Improvements Phase I

TABLE 10.42: YEAR 0, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Furnish & Install 21-inch Force Main	14,850		
2	Furnish & Install 30-inch	4,500		
3	Furnish & Install 27-inch	11,620		
4	Furnish & Install 24-inch	11,380		

TABLE 10.43: YEAR 10, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	New Lift Station-		1.6 MG	
2	Furnish & Install 18-inch Force Main	13,000		
3	Furnish & Install 30-inch	8,400		
4	Furnish & Install 27-inch	4,100		
5	Furnish & Install 24-inch	1,000		
6	Furnish & Install 18-inch	3,750		

TABLE 10.44: YEAR 20, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Upgrade New Lift Station		6.10 MGD	Add Capacity
2	Furnish & Install 33-inch	12,500		
3	Furnish & Install 30-inch	4,200		
4	Furnish & Install 21-inch	6,400		
5	Furnish & Install 18-inch	3,400		

Phase II – Build - Out

Interceptor System III

Continuing to build upon facilities constructed in Phase I, Interceptor III requires a tail-end extension of 18-inch diameter pipe. This extension, approximately 2,100 ft will convey wastewater generated by the study area's most northwestern corner. The New Lift Station will need an upgrade to 15.4 MGD to serve built-out development.

Interceptor System II

Interceptor II extends northwest from the existing Futureland Lift Station to the study area. The interceptor consists of 14,400 ft of 30-inch, 1,100 ft of 27-inch, 5,500 ft of 24-inch, and 9,100 ft of 15-inch, diameter sewer interceptor. The Futureland Lift Station will need to be upgraded to 19.3 MGD. Two 21-inch force mains, 2,600 ft each will convey the wastewater to the Fred Hervey Water Reclamation Plant. The wastewater interceptor follows an alignment generally described by the following:

a. In a northwesterly direction, approx. 7,000 ft., as a 30-inch diameter pipeline within an existing 50 ft easement to US-54.

b. Along US-54, approximately 1,700 ft, in a southwesterly direction to the proposed Northeast Parkway.
c. Along the Northeast Parkway, in a northwesterly direction as a 30-inch diameter pipeline for approximately 5,800 ft.
d. Continuing along the Northeast Parkway as a 27-inch diameter pipeline a distance of 1,100 ft.
e. Along the Northeast Parkway as a 24-inch interceptor a distance of 5,500 ft.
f. Ending as a 15-inch diameter trunk line that extends a distance of 9,100 ft along the Northeast Parkway.

Interceptor System I

The Interceptor I system consists of an existing interceptor, an extension of the interceptor, and a branch that will discharge into the interceptor. The existing interceptor is a 24-inch diameter pipeline that extends along Railroad Drive in a northeasterly direction from the Futureland Lift Station to the Futureland Subdivision. The extension of the interceptor will be 7,000 ft of a 21-inch diameter pipeline. It too will follow Railroad Drive's northeasterly alignment. The interceptor will make a left turn and extend 8,000 ft to the study area. The branch trunk line mentioned above will begin at the current dead-end manhole of the existing 24-inch interceptor. The 18-inch trunk line will extend in a northwesterly direction approximately 5,500 ft to the study area. See Plate 35 (provided by EPWU).

Plate 35 NEMP Wastewater System Improvements Phase II

TABLE 10.45: YEAR 30, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Upgrade New Lift Station		2.5 MGD	Add Capacity
2	Furnish & Install 18-inch Force Main	13,000		
3	Furnish & Install 18-inch	2,100		

TABLE 10.46: YEAR 35, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Upgrade Future Land Lift Station		8.8 MGD	Add Capacity
2	Furnish & Install 21-inch Force Main	2,600		
3	Furnish & Install 30-inch	14,400		
4	Furnish & Install 27-inch	1,100		
5	Furnish & Install 18-inch	5,500		

TABLE 10.47: YEAR 40, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Upgrade Future Land Lift Station		5.2 MGD	Add Capacity
2	Furnish & Install 21-inch Force Main	2,600		
3	Furnish & Install 24-inch	5,500		
4	Furnish & Install 21-inch	14,700		

TABLE 10.48: YEAR 50, RECOMMENDED WASTEWATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Upgrade New Lift Station		5.2 MGD	Add Capacity
2	Upgrade Future Land Lift Station		5.3 MGD	Add Capacity
3	Furnish & Install 15-inch	9,100		

Wastewater Treatment

The Fred Hervey Water Reclamation Plant; which has a design treatment capacity of 10 MGD, currently treats 7-8 MGD. The plant will require expansion to an ultimate capacity of 55 MGD. The expansion can be conducted concurrently with the other wastewater system construction. That is, following the proposed phasing plan.

Cost Analysis of Wastewater System Improvements

To provide wastewater collection and treatment service to the study area several major wastewater facilities will have to be constructed. Estimated construction costs associated to the preliminary phasing plan that was developed by EPWU based on 10-year intervals are presented in the following Tables 49 to 55. A monetary savings can be realized if the four existing crossing under US-54 can be utilized to channel through the proposed

interceptors. Costs associated to upgrades to the Fred Hervey Water Reclamation Plant have not been included in this study.

TABLE 10.49: YEAR 0, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Furnish & Install 21-inch Force Main	LF	14,850	$100	$1,485,000
2	Furnish & Install 30-inch	LF	4,500	$140	$630,000
3	Furnish & Install 27-inch	LF	11,620	$120	$1,394,400
4	Furnish & Install 24-inch	LF	11,380	$100	$1,138,000
5	48-inch Steel Casing Jack and Bore	LF	500	$650	$325,000
6	Furnish & Install 72-inch Manholes	EA	42	$10,000	$420,000
7	Trench Excavation Protection	LF	41,850	$3	$125,550
8	Pavement Cut and Restore	SF	0	$7	$0
9	Traffic Control	LS	1	$3000	$3000
10	Cement Stabilized Backfill	CY	2,750	$55	$151,250
11	Sub-Total				**$5,672,200**
12	Mobilization	%	5		$283,610
13	Contingencies	%	15		$850,830
14	Engineering	%	15		$850,830
15	Total Estimated Construction Cost				**$7,657,470**

TABLE 10.50: YEAR 10, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	New Lift Station-add 1.6 MGD	LS	1	$219,413	$219,413
2	Furnish & Install 18-inch Force Main	LF	13,000	$90	$1,170,000
3	Furnish & Install 30-inch	LF	8,400	$140	$1,176,000
4	Furnish & Install 27-inch	LF	4,100	$120	$492,000
5	Furnish & Install 24-inch	LF	1,000	$100	$100,000
6	Furnish & Install 18-inch	LF	3,750	$65	$243,750
7	Furnish & Install 72-inch Manholes	EA	18	$10,000	$18,000
8	Trench Excavation Protection	LF	30,250	$3	$90,750
9	Pavement Cut and Restore	SF	0	$7	$0
10	Traffic Control	LS	1	$5000	$5000
11	Cement Stabilized Backfill	CY	1200	$55	$66,000
12	Sub-Total				**$3,580,913**
13	Mobilization	%	5		$179,046
14	Contingencies	%	15		$537,138
15	Engineering	%	15		**$**537,138
16	Total Estimated Construction Cost				**$4,834,235**

TABLE 10.51: YEAR 20, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Upgrade New Lift Station-add 6.1 MGD	LS	1	$836,511	$836,511
2	Furnish & Install 33-inch	LF	12,500	$150	$1,875,000
3	Furnish & Install 30-inch	LF	4,200	$140	$588,000
4	Furnish & Install 21-inch	LF	6,400	$80	$512,000
5	Furnish & Install 18-inch	LF	3,400	$65	$221,000
6	Furnish & Install 72-inch Manholes	EA	27	$10,000	$270,000
7	Trench Excavation Protection	LF	26,500	$3	$79,500
8	Pavement Cut and Restore	SF	0	$7	$0
9	Traffic Control	LS	1	$3000	$3000
10	Cement Stabilized Backfill	CY	0	$55	$0
11	Sub-Total				**$4,385,011**
12	Mobilization	%	5		$219,251
13	Contingencies	%	15		$657,753
14	Engineering	%	15		$657,753
15	Engineering	%	15		**$5,919,768**

TABLE 10.52: YEAR 30, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE 2

No.	De2cription	Unit	Quantity	Cost/Unit	Total
1	Upgrade New Lift Station-add 2.5 MGD	LS	1	$342,832	$342,832
2	Furnish & Install 18-inch Force Main	LF	13,000	$90	$1,170,000
3	Furnish & Install 18-inch	LF	2,100	$65	$136,500
4	Furnish & Install 72-inch Manholes	EA	2	$10,000	$20,000
5	Trench Excavation Protection	LF	2,100	$3	$6,300
6	Pavement Cut and Restore	SF	0	$7	$0
7	Traffic Control	LS	1	$3000	$0
8	Cement Stabilized Backfill	CY	0	$55	$0
9	Sub-Total				**$1,675,632**
10	Mobilization	%	5		$83,782
11	Contingencies	%	15		$251,346
12	Engineering	%	15		**$**251,346
13	Total Estimated Construction Cost				$**2,262,106**

TABLE 10.53: YEAR 35, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Upgrade Future Land Lift Station-add 8.8 MGD	LS	1	$1,206,760	$1,206,760
2	Furnish & Install 21-inch Force Main	LF	2,600	$100	$260,000
3	Furnish & Install 30-inch	LF	14,400	$140	$2,016,000
4	Furnish & Install 27-inch	LF	1,100	$120	$132,000
5	Furnish & Install 18-inch	LF	5,500	$65	$357,500
6	52-inch Steel Casing Jack and Bore	LF	500	$700	$350,000
7	42-inch Steel Casing Jack and Bore	LF	500	$600	$300,000
8	Furnish & Install 72-inch Manholes	EA	23	$10,000	$230,000
9	Trench Excavation Protection	LF	22,600	$3	$67,800
10	Pavement Cut and Restore	SF	0	$7	$0
11	Traffic Control	LS	1	$5000	$5000
12	Cement Stabilized Backfill	CY	0	$55	$0
13	Sub-Total				**$4,925,060**
14	Mobilization	%	5		$246,253
15	Contingencies	%	15		$738,759
16	Engineering	%	15		**$**738,759
17	Total Estimated Construction Cost				**$6,648,831**

TABLE 10.54: YEAR 40, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Upgrade Future Land Lift Station-add 5.2 MGD	LS	1	$713,086	$713,086
2	Furnish & Install 21-inch Force Main	LF	2,600	$100	$260,000
3	Furnish & Install 24-inch	LF	5,500	$100	$550,000
4	Furnish & Install 21-inch	LF	14,700	$80	$1,176,000
5	48-inch Steel Casing Jack and Bore	LF	500	$650	$325,000
6	Furnish & Install 72-inch Manholes	EA	21	$10,000	$210,000
7	Trench Excavation Protection	LF	22,800	$3	$68,400
8	Pavement Cut and Restore	SF	0	$7	$0
9	Traffic Control	LS	1	$5000	$5000
10	Cement Stabilized Backfill	CY	0	$55	$0
11	Sub-Total				**$3,307,486**
12	Mobilization	%	5		$165,374
13	Contingencies	%	15		$496,123
14	Engineering	%	15		**$**496,123
15	Total Estimated Construction Cost				**$4,465,106**

TABLE 10.55: YEAR 50, CONSTRUCTION COST ESTIMATE-WASTEWATER PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Upgrade New Lift Station-add 5.2 MGD	LS	1	$713,086	$713,086
2	Upgrade Future Land Lift Station-add 5.3 MGD	LS	1	$726,800	$726,800
3	Furnish & Install 15-inch	LF	9,100	$55	$500,500
4	Furnish & Install 72-inch Manholes	EA	10	$10,000	$100,000
5	Trench Excavation Protection	LF	9,100	$3	$27,300
6	Pavement Cut and Restore	SF	0	$7	$0
7	Traffic Control	LS	1	$5000	$0
8	Cement Stabilized Backfill	CY	0	$55	$0
9	Sub-Total				**$2,067,686**
10	Mobilization	%	5		$103,384
11	Contingencies	%	15		$310,153
12	Engineering	%	15		**$**310,153
13	Total Estimated Construction Cost				**$2,791,376**

Phase 1,– Total Estimated Construction Cost $18,411,473

Approximate Cost: $18,500,000

Phase 2,– Total Estimated Construction Cost $16,167,419

Approximate Cost: $16,200,000

Grand Total Wastewater Systems Cost for Built-Out of the NE Master Plan $34,578,892

Approximate Cost: $34,600,000

RECLAIMED WATER SYSTEM ANALYSIS

Existing Reclaimed Water Distribution System

The El Paso Water Utilities currently operates and maintains a reclaimed water system that extends through the study area.

The Fred Hervey Water Reclamation Plant treats a large portion of Northeast El Paso's wastewater. The plant was designed to treat 10 MGD of raw wastewater into water quality standards. Due to system inefficiencies the plant can only treat 7-8 MGD. The reclaimed water is pumped via a 30-inch pipeline to a 750,000 gallon storage tank. Ten (10) injection wells are spread along the 30-inch pipeline's route; which inject the treated wastewater into the Hueco Bolson. A booster station is located at the tank site. This booster station pumps reclaimed water through a 16-inch pipeline to an El Paso Electric Company power generating sub-station, see Plate 36 (provided by EPWU).

Reclaimed water is also utilized by the Painted Dunes Golf Course for irrigating their turf.

TABLE 10.56: EXISTING RECLAIMED WATER DISTRIBUTION SYSTEM

No.	STREET	FROM	TO	PIPE MATERIAL	SIZE In	Comments
1		Fred Hervey WWTP	750,000 gallon Tank Block 81, Section 19	SCCP	30	Thru PSB property in a westerly direction
2		Booster Station Block 81, Section 19	El Paso Electric Co. Sub-station	PVC	16	Along the common section line of Block 81, Sections 19 & 20

Projected Demands

Reclaimed water service to the study area is limited to landscape irrigation or commercial, and industrial developments, and turf irrigation for schools and parks. No residential irrigation was considered in this study. Landscapable areas for commercial and industrial development were calculated as 7% of the total area. Half (50%) of a school acreage was considered to be turf, while parks was 100%. Table 10.58 shows a break down of the land in the study area that will require irrigation.

Plate 36 NEMP Existing Reclaimed Water System

TABLE 10.57: NORTHEAST MASTER PLAN – LANDSCAPE OR TURF ACREAGE

LAND USE	ACRES
Residential	0
Commercial	76
Office	103
Retail	36
Industrial	79
Public	1
Parks	820
Schools	157
PMD	0
Total	1,272

The following paragraphs explain the development of the average and peak day demands used to size the reclaimed water facilities that are required for the Phase I (first 30 Years Growth) and the Phase II-Built Out scenarios. Due to pressure limitations, the reuse system will have to function similar to the potable water system. That is, a number of reservoirs and booster stations will be needed to provide adequate pressures (45 psi). For this report the project area was divided into two service areas; which are the same as the potable water system.

Phase I - 30 Year Growth

As previously mentioned, residential reclaimed water service was not considered in this study. The required watering demands per acre of turf was based on the estimated unit use found in EPWU' Rules and Regulations No. 5 – Local Government Turf Irrigation Accounts; which provides for 46 inches per acre per year (1.24 MG/ac/yr) of irrigation water. The estimated unit (per acre) evapotranspiration (ET) requirement for turf in the El Paso area is shown in Table 10.58. The indicated monthly values represent over-seeding of the turf in the fall, which increases the October-to-March ET demand for the actively growing over-seeded cool-season grass.

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TABLE 10.58: ESTIMATED TURF EVAPOTRANSPIRATION

Month	Maximum Ccf/Acre	Estimated ET (ac-in/ac)	Monthly Dist. (%)
January	40	1.10	2.4
February	40	1.10	2.4
March	50	1.38	3.0
April	180	4.96	10.9
May	200	5.51	12.0
June	280	7.71	16.9
July	280	7.71	16.9
August	200	5.51	12.0
September	180	4.96	10.9
October	120	3.31	7.2
November	50	1.38	3.0
December	40	1.1	2.4
Total	**1660**	**45.73**	**100.0**

The maximum day demand for Phase 1 and Phase 2-Built Out were calculated based on the landscape irrigation demand patterns shown on Table 10.59.

TABLE 10.59: RECOMMENDED LANDSCAPE IRRIGATION DEMAND PATTERN

LAND USE	M	T	W	TH	F	S	Sun	Watering Time
Comm. Even		■			■		■	6 pm to 10 am
Comm. Odd	■			■		■		6 pm to 10 am
Public	■		■			■		6 pm to 10 am
Parks	■		■		■			6 pm to 10 am
Painted Dunes		■		■			■	6 pm to 10 am
Schools		■		■		■		6 pm to 10 am
Industrial Even			■		■		■	6 pm to 10 am
Industrial Odd		■		■		■		6 pm to 10 am
Sludge Landfill	■		■			■		6 pm to 10 am
Landfill		■			■		■	6 pm to 10 am
El Paso Electric	■	■	■	■	■	■	■	All Day

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TABLE 10.60: ESTIMATED MAXIMUM DAY DEMANDS (gpm)-Phase 1

LAND USE	M	T	W	TH	F	S	Sun
Comm. Even		29			29		29
Comm. Odd	29			29		29	
Public	2		2			2	
Parks	2912		2912		2912		
Painted Dunes		3628		3628			3628
Schools	311		311		311		
Industrial Even							
Industrial Odd							
Sludge Landfill							
Landfill							
El Paso Electric	2523	2523	2523	2523	2523	2523	2523
Total (gpm)	5,777	**6,180**	5,748	**6,180**	5,775	2,554	**6,180**
Total (MGD)	8.32	**8.90**	8.28	**8.90**	8.32	3.68	**8.90**

As indicated in Table 10.60, the maximum day demand for Phase 1 will occur on Tuesdays, Thursdays, and Sundays, with a total of 8.90 MGD. This maximum day demand was calculated by taking the following into account.

- Maximum month demand equals 16.9% of annual demand, which occurs in the months of June and July, see Table 10.58.
- Maximum day demand equals 2.33 times the maximum month average daily demand

The peak hourly rate demands were based on the number of hours within which the maximum day demand occurs (16 hours) with a total of 13.35 MGD for the project area, see Table 10.61. The peak factor used to calculate the peak hourly demand rate was determined to be 1.5.

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TABLE 10.61: ESTIMATED PEAK HOURLY DEMANDS (gpm)-Phase 1

LAND USE	M	T	W	TH	F	S	Sun
Comm. Even		44			44		44
Comm. Odd	44			44		44	
Public	3		3			3	
Parks	4368		4368		4368		
Painted Dunes		5443		5443			5443
Schools	467		467		467		
Industrial Even							
Industrial Odd							
Sludge Landfill							
Landfill							
El Paso Electric	3784.50	3784.50	3784.50	3784.50	3784.50	3784.50	3784.50
Total (gpm)	8,666	**9,271**	8,623	**9,271**	8,664	3,832	**9,271**
Total (MGD)	12.48	**13.35**	12.42	**13.35**	12.48	5.52	**13.35**

Phase II - Built-Out

Similarly to Phase I the maximum day demand was calculated based on the landscape irrigation demand patterns shown on Table 10.59.

TABLE 10.62: ESTIMATED MAXIMUM DAY DEMANDS (gpm)-Built Out

LAND USE	M	T	W	TH	F	S	Sun
Comm. Even		1212			1212		1212
Comm. Odd	1212			1212		1212	
Public	15		15			15	
Parks	5612		5612		5612		
Painted Dunes		3628		3628			3628
Schools		1767		1767		1767	
Industrial Even			293		293		293
Industrial Odd		293		293		293	
Sludge Landfill	1400		1400			1400	
Landfill		750			750		750
El Paso Electric	2523	2523	2523	2523	2523	2523	2523
Total (gpm)	**10,762**	10,173	9,843	9,423	10,391	7,209	8,407
Total (MGD)	**15.50**	14.65	14.17	13.57	14.96	10.38	12.11

As indicated in Table 10.62, the maximum day demand for Phase II-Built Out will occur on Mondays (in contrast to Phase I) with a total of 15.50 MGD. This maximum day demand was calculated by taking the following into account.

- Maximum month demand equals 16.9% of annual demand, which occurs in the months of June and July, see Table 10.58.
- Maximum day demand equals 2.33 times the maximum month average daily demand

The peak hourly rate demands were based on the number of hours within which the maximum day demand occurs (16 hours) with a total of 23.25 MGD for the project area, see Table 10.63. The peak factor used to calculate the peak hourly demand rate was determined to be 1.5.

TABLE 10.63: ESTIMATED PEAK HOURLY DEMANDS (gpm)-Built Out

LAND USE	M	T	W	TH	F	S	Sun
Comm. Even		1818			1818		1818
Comm. Odd	1818			1818		1818	
Public	22.5		22.5			22.5	
Parks	8418		8418		8418		
Painted Dunes		5442		5442			5442
Schools		2650.5		2650.5		2650.5	
Industrial Even			439.5		439.5		439.5
Industrial Odd		439.5		439.5		439.5	
Sludge Landfill	2100		2100			2100	
Landfill		1125			1125		1125
El Paso Electric	3784.5	3784.5	3784.5	3784.5	3784.5	3784.5	3784.5
Total (gpm)	**16,143**	15,260	14,765	14,135	15,585	10,815	12,609
Total (MGD)	**23.25**	22	21.26	20.35	22.44	15.57	18.16

Reclaimed Water System Recommendations

This section describes the proposed reclaimed water facilities improvements needed beginning at Year 0 (immediately after first land sale), Year 10, Year 20, Year 30, Year 35, Year 40, Year 50, and Year 60 (build-out).

As previously mentioned, due to pressure limitations, the reuse system will have to function similar to the potable water system. That is, a number of reservoirs and booster stations will be needed to provide adequate pressures (45 psi). For this report the project area was divided into two service areas; which are the same as the potable water system.

Two new pressure zones will be created, Franklin East 1 PZ, and Franklin East 2 PZ. The area located lower than elevation 4,100 feet to US-54 will lay within the Franklin East 1 Pressure Zone. The area located from elevation 4,300 feet (more or less the Planned Mountain Development boundary) to elevation 4,100 feet will lay within the Franklin East 2 Pressure Zone. The creation of an intermediate pressure zone from elevation 4,200 ft to 4,100 ft will be necessary.

Phase I - 30 Year Growth

Franklin East 1 Pressure Zone
The El Paso Water Utilities currently operates and maintains a reclaimed water system that extends through the study area.

The Fred Hervey Water Reclamation Plant treats a large portion of Northeast El Paso wastewater. The plant was designed to treat 10 MGD of raw wastewater into water quality standards. Due to system inefficiencies the plant can only treat 7-8 MGD. The plant will have to be expanded to treat Phase 1's projected wastewater, approximately 17 MGD (maximum day flow) plus the current 7 MGD. The expansion can also be phase out in relation to the water and wastewater facilities.

As previously mentioned, the calculated maximum day demand for reclaimed water is approximately 8.9 MGD, and the peak hourly demand is 13.35 MGD. Facilities to extend this quantity of reclaimed water will be required, but not all of the facilities are required at the same time. A phasing plan to construct the facilities is shown in the following tables.

A 30-inch diameter force main that will convey the treated wastewater from the plant to a new 1 MG elevated storage reservoir will be constructed. It may be possible that the existing 30-inch pipeline can be used to convey the treated water to the reservoir. The supply reservoir; which will have an overflow elevation of 4138 ft will be provided distribution/equalization storage for the East High Pressure Zone and will also serve as supply storage for a new booster station.

Reclaimed Water Booster Station #1 will pump 7 MGD of reclaimed water during Phase 1 to Franklin East 1 Reclaimed Water Reservoir #1. Franklin East 1 Reclaimed Water Reservoir #1 will have a storage capacity of 1.5 MG. Franklin East 1 Reclaimed Water Reservoir #2 will be constructed in the tail end of Phase 1. Several 24-inch, 20-inch, and 16-inch diameter pipelines will be constructed in accordance to the proposed phasing plan as shown in Tables 10.64 to 10.66. Plate 37 (provided by EPWU) illustrates a diagrammatic description of the improvements.

Plate 37 NEMP Reclaimed Water System - Phase I

TABLE 10.64: YEAR 0, RECOMMENDED RECLAIMED WATER IMPROVEMENTS

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Supply Res. #1, East High PZ		1 MG	
2	Booster Station #1		1 MGD	
3	Franklin East 1 Reservoir #1		2 MG	
4	Furnish & Install 24-inch	6,750		
5	16-inch	11,850		

TABLE 10.65: YEAR 10, RECOMMENDED RECLAIMED WATER IMPROVEMENTS FRANKLIN EAST 1 & 2

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Booster Station #1		2 MGD	Add Capacity
2	Franklin East 2 Res. #1		0.3 MG	
3	Franklin East 1 Booster Station #1		1.5 MGD	
4	16-inch PVC	20,400		

TABLE 10.66: YEAR 20, RECOMMENDED RECLAIMED WATER IMPROVEMENTS – FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Booster Station #1		4 MGD	Add Capacity
2	Franklin East 1 Res. #2		1.5 MG	
3	Furnish & Install 20-inch SCCP	6,550		
4	16-inch PVC	17,800		

Franklin East 2 Pressure Zone

District 2 of the study area is completely located within the proposed Franklin East 2 Pressure Zone. This area is located west and northwest of the existing North Hills Subdivision. It is the projection of this report that the development of District 2 will begin in Year 10. At this time the construction of Franklin East 1 Reclaimed Water Booster Station #1 at the Franklin East 1 Reclaimed Water Reservoir #1; which will be constructed in Year 10, and Franklin East 2 Reclaimed Water Reservoir #1 with an overflow elevation of 4404 ft will be necessary, see Table 10.66. A 16-inch diameter reclaimed waterline to connect the booster station to the reservoir will also be required. Franklin East 1 Reclaimed Water Booster Station #1 will have a firm pumping capacity of 1.5 MGD. The Franklin East 1 Reclaimed Water Reservoir #1 will have a 0.3 MG storage capacity and will be located within the PMD zone near the state park boundary line. This reservoir will serve development located between elevations 4300 ft to 4100 ft. An intermediate pressure zone will be created between elevations 4200 ft to 4100 ft. Several pressure reducing valves will be required along contour elevation 4200 ft, see Plate 37 (provided by EPWU), for a diagrammatic description of the improvements.

No improvements are necessary to serve the Franklin East 2 Pressure Zone in Years 0 or 20.

Phase II – Build - Out

Phase II of the development includes the remaining portion of the study area, basically the northern half. The development of this area is projected to start after Phase I, 30 years and reach built out in 60 years; or 30 years after Phase I is completely developed. It is assumed that the reclaimed water facilities mentioned in the previous paragraphs have been constructed and are fully operational.

Franklin East 1 Pressure Zone

Again, most of study area's Phase II is located within the proposed Franklin East 1 Pressure Zone.

Additional pumping capacity (2 MGD) will be required at Booster Station #1 and additional storage capacity (1.5 MG) will also be required to serve the Franklin East 1 Pressure Zone. A second 1.0 MG elevated reclaimed water supply reservoir that will serve the East High Pressure Zone will be constructed in Year 35. A preliminary location for the reservoir is the intersection of the proposed Northeast Parkway and US 54. A booster station (Booster Station #2) at the second elevated storage reservoir with an ultimate firm pumping capacity of 9.0 MGD to meet built out demand will pump reclaimed water into the Franklin East Pressure Zone. A series of 24-inch, 20-inch, and 16-inch pipelines will be required to transport the reclaimed water from the East High Reservoir to the Franklin East 1 Reservoirs, see Plate 38 (provided by EPWU).

The following tables show the required improvements for the Franklin East 1 Pressure Zone for Year 30 to Built Out.

TABLE 10.67: YEAR 30, RECOMMENDED RECLAIMED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Booster Station #1		2 MGD	Add Capacity

TABLE 10.68: YEAR 35, RECOMMENDED RECLAIMED WATER IMPROVEMENTS FRANKLIN EAST 1

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Supply Reservoir #2		1 MG	
2	Booster Station #2		1 MGD	
3	Furnish & Install 20-inch SCCP	6,200		
4	24-inch SCCP	14,500		

Plate 38 NEMP Reclaimed Water System - Phase II

Franklin East 2 Pressure Zone

District 1 of the study area is completely located within the proposed Franklin East 2 Pressure Zone. This area encompasses approximately 1,478 acres of the Master Plan's most northwestern corner. It is the projection of this report that the development of District 1 will begin in Year 50. At this time the construction Franklin East 1 Reclaimed Water Booster Station #2 at the Franklin East 1 Reclaimed Water Reservoir #3; which will be constructed in Year 40, and a new reservoir (Franklin East 2 Reclaimed Water Reservoir #2) with an overflow elevation of 4404 ft will be necessary. A 16-inch diameter pipeline to connect Franklin East 1 Reclaimed Water Booster Station #2 to Franklin East 2 Reclaimed Water Reservoir #2 will also be required. Franklin East 1 Reclaimed Water Booster Station #2 will have a firm pumping capacity of 1 MGD. Franklin East 2 Reclaimed Water Reservoir #2 will have a 0.3 MG storage capacity and will be located within the PMD zone near the state park boundary line. This reservoir will serve development located between elevations 4,300 ft to 4,100 ft; through a couple of pressure reducing valves to serve below elevation 4,200 ft. See Plate 38 (provided by EPWU).

TABLE 10.69: YEAR 40, RECOMMENDED RECLAIMED WATER IMPROVEMENTS FRANKLIN EAST 1& 2

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Booster Station #2		7 MGD	Add Capacity
2	Franklin East 1 Reservoir #3		1.5 MG	
3	Franklin East 2 Reservoir #1		0.3 MG	
4	Franklin East 1 Booster Station #2		1 MGD	
5	16-inch PVC	34,600		

TABLE 10.70: YEAR 50, RECOMMENDED RECLAIMED WATER IMPROVEMENTS FRANKLIN EAST 2

No.	Improvement Description	Length (ft)	Capacity	Comments
1	Booster Station #2	11,850	1 MGD	Add Capacity

COST ANALYSIS OF RECLAIMED WATER SYSTEM IMPROVEMENTS

To distribute the projected reclaimed water demand several system improvements must be constructed. Estimated construction costs associated to the preliminary phasing plan that was developed by EPWU based on 10-year intervals are presented in the following Tables.

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TABLE 10.71: YEAR 0, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 PZ-PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Supply Res. #1, East High PZ-1 MG	LS	1	$1,500,000	$1,500,000
2	Booster Station #1-1 MGD	LS	1	$96,000	$96,000
3	Franklin East 1 Reservoir #1-2 MG	LS	1	$2,000,000	$2,000,000
4	Furnish & Install 24-inch	LF	6,750	$90	$607,500
5	Furnish & Install 16-inch	LF	11,850	$60	$711,000
6	Furnish & Install 48-inch Steel Casing – Jack and Bore	LF	500	$600	$300,000
7	Trench Excavation Protection	LF	18,600	$3	$55,800
8	Traffic Control	LS	1	$5000	$5000
9	Electrical	LS	1	$50,000	$50,000
10	Telemetry	LS	1	$20,000	$20,000
11	Chlorination	LS	1	$7000	$7000
12	Sub-Total				**$5,352,300**
13	Mobilization	%	5		$267,615
14	Contingencies	%	15		$802,845
15	Engineering	%	15		$802,845
16	Total Estimated Construction Cost				**$7,552,605**

TABLE 10.72: YEAR 10, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 & 2 PZ-PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Booster Station #1-Add 2 MGD	LS	1	$192,000	$192,000
2	Franklin East 2 Res. #1-0.3 MG	LS	1	$300,000	$300,000
3	Franklin East 1 Booster Station #1-1.5 MGD	LS	1	$144,000	$144,000
4	Furnish & Install 16-inch PVC	LF	20,400	$60	$1,224,000
5	Trench Excavation Protection	LF	20,400	$3	$61,200
6	Pavement Cut and Restore	SF	0	$7	$0
7	Traffic Control	LS	1	$5000	$0
8	Electrical	LS	1	$75,000	$75,000
9	Telemetry	LS	1	$30,000	$30,000
10	Chlorination	LS	1	$12,000	$12,000
11	Land Acquisition	SF	0	$10	$0
12	Sub-Total				**$2,038,200**
13	Mobilization	%	5		$101,910
14	Contingencies	%	15		$305,730
15	Engineering	%	15		**$**305,730
16	Total Estimated Construction Cost				**$2,751,570**

TABLE 10.73: YEAR 20, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 PZ-PHASE 1

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Booster Station #1-Add 4 MGD	LS	1	$384,000	$384,000
2	Franklin East 1 Res. #2-1.5 MG	LS	1	$1,500,000	$1,500,000
3	Furnish & Install 20-inch SCCP	LF	6,550	$75	$491,250
4	Furnish & Install 16-inch PVC	LF	17,800	$60	$1,068,000
5	Trench Excavation Protection	LF	24,350	$3	$73,050
6	Traffic Control	LS	1	$5000	
7	Electrical	LS	1	$125,000	$125,000
8	Telemetry	LS	1	$50,000	$50,000
9	Chlorination	LS	1	$25,000	$25,000
10	Land Acquisition	SF	0	$10	$0
11	Sub-Total				**$3,716,300**
12	Mobilization	%	5		$185,815
13	Contingencies	%	15		$557,445
14	Engineering	%	15		**$**557,445
15	Total Estimated Construction Cost				**$5,017,005**

TABLE 10.74: YEAR 30, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Booster Station #1-Add 2 MGD	LS	1	$192,000	$192,000
2	Electrical	LS	1	$75,000	$75,000
3	Telemetry	LS	1	$30,000	$30,000
4	Chlorination	LS	1	$12,000	$12,000
5	Land Acquisition	SF	0	$10	$0
6	Sub-Total				**$309,000**
7	Mobilization	%	5		$15,450
8	Contingencies	%	15		$46,350
9	Engineering	%	15		**$**46,350
10	Total Estimated Construction Cost				$**417,150**

TABLE 10.75: YEAR 35, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Supply Reservoir #2-1 MG	LS	1	$1,500,000	$1,500,000
2	Booster Station #2-2 MGD	LS	1	$96,000	$96,000
3	Furnish & Install 48-inch Steel Casing – Jack and Bore	LF	500	$600	$300,000
4	Furnish & Install 20-inch SCCP	LF	6,200	$75	$465,000
5	Furnish & Install 24-inch SCCP	LF	14,500	$90	$1,305,000
6	Trench Excavation Protection	LF	20,700	$3	$62,100
7	Pavement Cut and Restore	SF	0	$7	$0
8	Traffic Control	LS	1	$20,000	$20,000
9	Electrical	LS	1	$50,000	$50,000
10	Telemetry	LS	1	$20,000	$20,000
11	Chlorination	LS	1	$7,000	$7,000
12	Sub-Total				**$3,825,100**
13	Mobilization	%	5		$191,255
14	Contingencies	%	15		$573,765
15	Engineering	%	15		$573,765
16	Total Estimated Construction Cost				**$5,163,885**

TABLE 10.76: YEAR 40, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 & 2 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Booster Station #2-Add 7 MGD	LS	1	$672,000	$672,000
2	Franklin East 1 Reservoir #3 - 1.5 MG	LS	1	$1,500,000	1,500,000
3	Franklin East 2 Reservoir #1 - 0.3 MG	LS	1	$300,000	$300,000
4	Franklin East 1 Booster Station #2-1 MGD	LS	1	$96,000	$96,000
5	Furnish & Install 16-inch PVC	LF	34,600	$60	$2,076,000
6	Trench Excavation Protection	LF	34,600	$3	$103,800
7	Traffic Control	LS	1	$20,000	$20,000
8	Electrical	LS	1	$250,000	$250,000
9	Telemetry	LS	1	$75,000	$75,000
10	Chlorination	LS	1	$35,000	$35,000
11	Sub-Total				**$5,107,800**
12	Mobilization	%	5		$255,390
13	Contingencies	%	15		$766,170
14	Engineering	%	15		**$**766,170
15	Total Estimated Construction Cost				$**6,895,530**

TABLE 10.77: YEAR 50, CONSTRUCTION COST ESTIMATE-RECLAIMED WATER FRANKLIN EAST 1 PZ-PHASE 2

No.	Description	Unit	Quantity	Cost/Unit	Total
1	Booster Station #2-Add 1 MGD	LS	1	$96,000	$96,000
2	Electrical	LS	1	$50,000	$50,000
3	Telemetry	LS	1	$20,000	$20,000
4	Chlorination	LS	1	$7,000	$7,000
5	Land Acquisition	SF	0	$10	$0
6	Sub-Total				**$173,000**
7	Mobilization	%	5		$8,650
8	Contingencies	%	15		$25,950
9	Engineering	%	15		$25,950
10	Total Estimated Construction Cost				**$233,550**

Phase 1, Franklin East 1 $ 2 Pressure Zones – Total Estimated Construction Cost $14,994,180
Approximate Cost: $15,000,000
Phase 2, Franklin East 1 $ 2 Pressure Zones – Total Estimated Construction Cost $12,710,115
Approximate Cost: $12,800,000
Grand Total Reclaimed Water Systems Construction Cost for Built-Out of the Northeast Master Plan $27,704,295
Approximate Cost: $27,800,000

Recommendations (provided by EPWU)

It is recommended that this study be used as EPWU's planning guide for water, wastewater, and reclaimed water infrastructure development for the study area. Due to the importance of meeting the predicted wastewater demands of the study area, and possibly supply reclaimed water to developments in the area, a recent study conducted by Brown and Caldwell Environmental Engineers and Consultants and confirmed by EPWU's modeling group concluded that the Fred Hervey Water Reclamation Plant will reach treatment capacity by Year 2013.

Conclusion (provided by EPWU)

The El Paso Water Utilities-Public Service Board currently provides water and wastewater service to the area located outside and south of the study area, mainly the North Hills Subdivision. Also the EPWU currently operates and maintains a reclaimed water system that extends through the study area.

The Fred Hervey Water Reclamation Plant treats a large portion of Northeast El Paso wastewater. The plant was designed to treat 10 MGD of raw wastewater but due to system inefficiencies the plant can only treat 7-8 MGD. The reclaimed water is pumped via a 30-inch pipeline to a 750,000 gallon storage tank. Ten (10) injection wells are spread along the 30-inch pipeline's route; which inject the treated wastewater into the Hueco Bolson. A booster station is located at the tank site. This booster station pumps reclaimed water through a 16-inch pipeline to an El Paso Electric Company power generating sub-station. Reclaimed water is also utilized by the Painted Dunes Golf Course for irrigating their turf.

To extend water, wastewater, and reclaimed water service to the Northeast Master Plan area major facilities must be constructed. None of these improvements have been appropriated for construction in the near future. The earliest improvement indicated in the EPWU-PSB's CIP is the construction of the North 2 Reservoir in Year 2006.

The estimated construction cost to provide water service to Phase I of the development is $46 million, for Phase II is $47 million, for wastewater; Phase I is $18.50 million, for Phase II is $16.2 million; for reclaimed water, Phase I is $15.0 million, and for Phase II is $12.80 million.

11.0 DEMOGRAPHICS OF SELECTED PLAN

POPULATION REVIEW

Based on the revised Alternate Plan E, the future potential population was calculated for Proposed Master Plan Alternative E. Various population projection models were considered including the following:

Cohort Residual Technique – This model analyzes births, deaths, in migration and out migration to an area. The basic equation for this approach is as follows:

P(f) = P(c) + NI + NM

Where;

P(f) = Future Population
P(c) = Current Population
NI = Natural Increase (births – deaths)
NM = Net Migration (in migration – out migration)

This approach is considered the most comprehensive methodology for population projections. The challenge with this approach, however, is its complexity and its poor application to small areas. The State of Texas Demographics Research Center at Texas A&M University calculates population growth by county, by age, by race, and by gender utilizing this type of approach. Demographic research indicates that it is extremely difficult to adjust for NM at the small area (less than county level). Given the poor set relative to migration, this approach was not utilized.

Capacity Analysis – This model analyzes the holding capacity of a given geographical land mass. In specific, this type of approach is as follows:

P(f) = GRL * DN * D * PPH

Where;

P(f) = Future Population
GRL = Gross residential land (single family, multi-family, etc.)
DN = Development net ratio
D = Density
PPH = Persons per household

Although this methodology is not as comprehensive, it is a more common approach to population projections for a small area (sub-county). Given local residential development

criteria, typical densities for single family and multi-family respectively, and a persons per household index for single family and multi-family developments respectively, one can calculate the holding capacity of a given geographic land mass. However, this approach does not yield cohort sensitive data; therefore, additional index calculations for school aged children must be applied. Additionally, this approach does not provide for a year-to-year projection; rather, it describes an ultimate build-out scenario.

Once a total holding capacity population is calculated, an expected build-out and year-to-year growth must be calculated. This "growth rate" can be calculated by using a number of methods including "Shift Share", "Trend Analysis", "Exponential Growth" and others. All growth models are subject to error and have pros and cons. Please note that this population projection is merely an order of magnitude projection. The ultimate population growth is solely dependent on the EPWU selling property for development and the City of El Paso allowed development standards.

Table 11.1 illustrates how the population capacity model is calculated. The number of "Acres" multiplied by the "Development Net" (approximately 25% of all land is lost to rights-of-ways, utilities, easements, etc.) multiplied by the probable density will yield a probable total number of dwelling units. This number is then multiplied by the "Persons per Household" index to derive a population. In this case a low and high were used for a greater range and thus a greater confidence level.

TABLE 11.1: Population Projects Methodology

	Acres	Development Net	Maximum Density	Persons per Household	Number of Units	Build-Out Population
Residential Population						
Low Density Residential						
High	2,128	0.75	4	3.07	6,384	19,600
Low				3.5		22,344
Medium Density Residential						
High	4,372	0.8	8	3.07	27,981	85,901
Low				3.5		97,933
High Density Residential						
High	1,396	0.8	20	3.07	22,336	68,572
Low		0.8		3.5		78,176
Town Center Residential						
Urban (low)	515	0.2	12	1.2	1,236	1,483
Urban (high)				1.5		1,854
High Density (low)	515	0.3	30	1.2	4,635	5,562
(high)				1.5		6,953
Total	8,411				62,572	
Population Minimum Range						181,118
Population Maximum Range						207,260

As has been discussed, the growth of the population cannot simply be studied as an independent outcome. Growth is a completely dependent outcome based on PSB policy. Therefore, it would be erroneous to attempt at "predicting" a growth pattern. However, for planning sakes, the EPWU and the consultant team anticipated an overall growth that may fluctuate from year to year but that will average out over time at approximately two percent (2%). This growth rate equates to approximately two hundred fifty acres (250) per year of development starting Year 1 (whenever the EPWU sells land). Some years may experience higher growth rates and some may experience lower growth rates, but the EPWU and the consultant team expected this average to be a fair assumption.

Using the Capacity Analysis method, the consultant team calculated anticipated build-out demographics as follows:

TABLE 11.2: Final Land Plan Acreage and Build-out Assumptions

	Total Acres	Residential Units	Pop	Expected Build-Out
NE PSB Land Plan E	**15,965**	**+ 63,000**	**181,000 – 207,000**	**+/- 60 Years**
Phase 1 Study	**5,180**	**+ 27,000**	**70,000 – 83,000**	**+/- 30 Years**

Although the consultant team analyzed the demographics and land use mix for the entire PSB land between US Hwy 54 and the New Mexico State line, the PSB only wishes to focus on Phase 1 (See Plate 39), which is described in more detail in Chapter 11.0.

SCHOOL DEMOGRAPHICS

EPISD

Phase 1 mostly includes land in the EPISD boundary. Once the total number of households was derived, the total number of children must be estimated as well. As indicated in the Existing Conditions report, each school district utilizes a "student population" index that is typically an observed factor. For each dwelling unit, a certain percentage of the household population is anticipated to be of elementary school age, of middle school age and of high school age. Using the index factors described in the Existing Conditions Report the anticipated elementary schools (0.2384 elementary students per household), middle schools (0.0993 middle school students per household) and the high school (0.1369 high school per household) needed to serve Phase 1 development were calculated. These are all located in the EPISD district. Total EPISD schools by type anticipated from the Phase 1 area are as follows:

	Approximate Number of Students
Elementary Schools Anticipated	**5 – 8**
Middle Schools Anticipated	**2**
High Schools Anticipated	**1**

Note that these "anticipated schools" are a function of land sold for development, density and timing. This analysis is not intended to suggest that the EPISD should go purchase these sites day one, but rather, to program these anticipated schools (hence costs) into their long term budgetary plans. As property is sold for development, the EPISD can evaluate the need for these particular facilities. Lastly, the Proposed Master Land Use Plan E has generally depicted where these facilities could be located. These generalized locations are only intended as guides for the EPISD and the EPWU to consider as land is sold for development. Depending on the limits of any land sale, a "school site" may appear to be not needed or redundant relative to other existing school sites. However, the "total demand" must still be met and so the EPISD should scrutinize any land purchase decision and track the overall development patterns and school site needs.

YISD

No elementary schools, middle schools, or high schools are anticipated in the YISD boundary due to Phase 1 development. Since there is only a small portion of Phase 1 development in YISD, there does not seem to be a need to provide a school at this time. Additionally, the Phase 1 residential land that is located within YISD is entirely included in the proposed retirement community area surrounding the Painted Dunes golf course. There will be a minimal number of students from this retirement community area, if it develops as such.

Plate 39 Master Plan Phasing Plan

12.0 PUBLIC POLICIES

As noted previously, Proposed Master Plan Alternative E does not comply with the City of El Paso's currently adopted Projected Land Use Plan (PLUP). If the City wishes to adopt the Proposed Master Plan Alternative E, State of Texas law dictates that the City initiate a formal PLUP amendment which requires certain public hearings as summarized in Chapter 213 of the Texas Local Government Code. The following summarizes the final land use assumptions for Proposed Master Plan Alternative E.

PROJECTED LAND USES

After finalizing the land plan, the consultant team calculated the projected land uses for the overall property. The land use mix is as follows:

Final Proposed Master Plan Alternative E Land Use Mix

Low Density Residential	**2,128 acres**
Med. Density Residential w/Neighborhood Commercial	**4,372 acres**
High Density Residential w/ Neighborhood Commercial	**1,396 acres**
Commercial	**1,081 acres**
Mixed-use Office	**1,373 acres**
Mixed-use Retail	**515 acres**
Industrial	**1,067 acres**
Public Spaces	**18 acres**
Parkland	**521 acres**
Natural Transition Buffer	**1,573 acres**
Schools	**431 acres**
-Elementary School	**19**
- Middle School	**4-5**
- High School	**3-4**
Total Acres	**14,475 acres**

However, the EPWU has directed the consultant team to submit to the City of El Paso, only a portion of the master plan for a "Land Study". This Land Study is less than six thousand acres and is depicted in Plate 39. The land use mix is as follows:

Final Proposed Master Plan Alternative E Phase 1 Land Use Mix:

Low Density Residential	**653 acres**
Med. Density Residential w/Neighborhood Commercial	**1,048 acres**
High Density Residential w/Neighborhood Commercial	**601 acres**
Commercial	**397 acres**
Mixed-use Office	**505 acres**
Mixed-use Retail	**245 acres**
Public Spaces	**7 acres**
Parkland	**286 acres**
Natural Transition Buffer	**963 acres**
Schools	**176 acres**
-Elementary School	**5-8**
- Middle School	**2**
- High School	**1**
Total Acres	**4,881 acres**

Some of the Land Use Designations are different than those that currently exist in the City of El Paso. Specifically, these designations propose a mix of uses in certain districts. The concept behind the mixing of uses is to promote sustainability and flexibility as the area evolves. The final Proposed Master Plan Alternative E land plan also promotes the use of a "Town Center" which is a distinctive land use designation that must be addressed.

Additionally, there is an area that is being designated as "Natural Transition Buffer". This area is an area that is both difficult to serve from a utility perspective as well as a sensitive area from a natural topography perspective. The area is adjacent to the foothills of the Franklin Mountains. This designation is slightly different that the City's existing nomenclature and should be studied by the city.

MASTER THOROUGHFARE PLAN (analysis to be provided by MPO/City Planning/EPWU)

Proposed Master Plan Alternative E proposes the use of several unique roadway design features. Although most of the roadway sections are identical to the City of El Paso's existing thoroughfare standards, the consultant team has proposed two new approaches. The first is the use of an "Town Center Collector" (See Plate 40). This Town Center Collector is specifically designed to provide for an efficient flow of traffic while promoting pedestrian safety. The cross section calls for two parallel parking lanes with all through traffic lanes being located between the parking lanes. This section does not have a raised median. Studies have illustrated that having the parking lanes provides for a more pedestrian friendly environment since there is a physical object between the pedestrian and the passing vehicle. The lane designation is still critical and must have

protected free left turns. This type of urban section requires detailed study of the traffic signal timing to optimize vehicular flow through the system.

The second unique approach is the inclusion of traffic circles that are functional but also frame key points of interest. Plate 41 and Plate 42 illustrate the proposed plan-view layouts of the various options for the traffic circles while Plate 43 illustrates the lane designations for the proposed McCombs realignment that will work in concert with the proposed roundabouts. These roundabouts are intended for continuous one-way flow through the circle. The consultant team has shared these concepts with the City of El Paso and TxDOT. As indicated previously, their concern is that LOS is maintained to at least currently planned levels.

The consultant team studied the existing MTP Model LOS. Using the 2025 data, the consultant team analyzed the proposed MTP. No intersections or links were determined to have an LOS of less than the current 2025 model anticipated LOS. The Appendix includes the technical memorandum and the data results. Refer to the transportation summary in Chapter 9 of this report. The Appendix data is based on the first approved Master Plan by the PSB. The final Master Plan changed to satisfy as much as possible the City's comments for Land Study approval.

Plate 40 Street Cross Sections

Plate 41 Section at Collector "P" Turnabout

Plate 42 Section at Sean Haggerty Turnabout

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PARKS SYSTEM

The existing parks plan for the City of El Paso indicates very few parks and recreation opportunities in this area. The proposed Master Plan Alternative E suggests a number of open spaces and recreational opportunities.

Specifically, the master plan proposes joint school-park locations for all elementary schools, middle schools and high schools. These parks and schools are co-located in order to minimize the overall infrastructure required (parking lots, water lines, etc.) while maximizing the overall positive impact to the community. Additionally, a number of open spaces have been carefully planned to anchor the built environment. Where possible, these areas have also been strategically placed to possibly serve as detention facilities during major storm events.

HIKE AND BIKE TRAIL SYSTEM

This property's adjacency to the Franklin Mountains makes it a perfect location for an extensive system of hiking and biking trails. The proposed Master Plan Alternative E illustrates hike and bike trails on the major super arterials as shown in the City's Transportation Mobility Plan (TMP). Additionally, the consultant team integrated the locations of several hike and bike trails that exist along the foothills of the mountain range. These trails have been previously mapped by the City of El Paso Planning Department and are reflected in the proposed Master Plan E. Additionally, the consultant team developed a conceptual design of a desirable trailhead. Plate 44 illustrates a template for a trailhead design program. This trailhead is specifically designed to incorporate the needs of hikers with exercise and stretching areas, bikers with designated parking for loading and unloading, as well as nature aficionados with information kiosks and lookout points.

FRANKLIN MOUNTAIN STATE PARK PLAN

Proposed Master Plan Alternative E contains the 1573 acre Natural Transition Buffer. This area is intended to remain mostly undeveloped. The City or the PSB could decide to allow minimal park development, hillside residential estate development or other very low impact uses if it is desired in the future. However, at present the proposed Master Plan Alternative E does not anticipate any developments in this "Natural Transition Buffer".

Northeast El Paso enjoys the best existing major thoroughfare network in the City with excellent, fairly rapid access to other parts of the City, Mexico, and to New Mexico. With completion of the North-South Freeway, and the northeast bypass (currently in schematic phase), conditions will improve and should provide enhanced access in coming decades.

Plate 44 Conceptual Trailhead Facilities

13.0 PHASING PLAN

The consultant team and the EPWU staff prepared various assumptions sets which established the foundation for the most likely phasing scenario for development of the subject property. Plate 45 illustrates a potential phasing plan for the Phase 1 part of the Proposed Master Plan Alternative E. Please note however that the ultimate timing for the development of the property is entirely dependent on the PSB's own policies. In specific, if the PSB invests significant funds on installing the critical infrastructure the property should develop faster. Conversely, if the PSB curtails its infrastructure investments then the property will develop at a slower pace. Similarly, the PSB land dispensation policy will greatly impact the rate of development as well as which parcels develop first. Although one might attempt to allocate infrastructure costs based on phasing, this is only appropriate at the macro level and not appropriate at the micro level. The infrastructure costs that were developed by the EPWU and the consultant team were of broader level detail and didn't assume a phasing plan cost detail. Therefore, if a booster station is needed in a certain phase or sub phase, the cost of that booster station was not evaluated at the margin; rather, the cost of the booster station was calculated to serve an entire area of which some or all of it may be developed simultaneously. Another example is the cost of the roadway system. Depending on which parcels of land the EPWU sells for development, will determine the timing and hence cost of construction. Unless all properties are developed by one entity, the costs that have been developed should not be used to make individual financial decisions on a micro level.

Although the area surrounding the golf course requires additional infrastructure be present prior to development, this area is better suited to be developed by a true master plan developer. Attracting such a developer in a joint-venture or a pure sale could significantly change the rate of development as well as the overall development pattern. Note that this area has not been included in the conceptual phasing plan. Due to the unique nature of the retirement community, the typical residential market forces do not apply with this particular property. Additionally, due to the infrastructure constraints indicated previously, the EPWU has elected to consider this property separate from the other Phase 1 property.

PLATE 45 MASTER PLAN PHASE 1 SUBPAHSING PLAN & PROBABLILITY

APPENDIX

Ralphs' report
HEC-1 Model